

## *S5KC™ Series*

*User Manual — 5-20kVA Modular UPS*



**SOLAHD**



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**IMPORTANT SAFETY INSTRUCTIONS**

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**SAVE THESE INSTRUCTIONS**

This manual contains important safety instructions. Read all safety, installation and operating instructions before operating the SolaHD S5KC modular UPS system. Adhere to all warnings on the unit and in this manual. Follow all operating and user instructions. Individuals must fully understand this equipment to install and operate it.

This product is designed for commercial/industrial use only. It is not intended for use with life support or other designated critical devices. Maximum load must not exceed that shown on the rating label. Install and operate the unit only in an indoor clean environment, free from conductive contaminants, moisture, flammable liquids, gases and corrosive substances. This SolaHD S5KC contains no user serviceable parts other than the user replaceable modules. Refer all faults to your local dealer, local Emerson representative or the Emerson SolaHD service group.

The SolaHD S5KC UPS system is designed for use on a properly earthed (grounded) “TN” electrical supply, for installation by qualified personnel. A qualified electrician must review and approve customer supplied wiring, circuit breakers, and intended loads and verify correct input, output, and earth connections to ensure compliance with the technical standards and local electrical codes of practice. Installation instructions and warning notices are found in this manual.

**WARNING**

Risk of electric shock. Can cause equipment damage, injury and death.

The battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed before replacing the battery pack:

- Wear rubber gloves and boots
- Remove rings, watches and other metal objects.
- Use tools with insulated handles.
- Do not lay tools or other metal objects on the batteries.
- If the battery kit is damaged in any way or shows signs of leakage, contact your local Emerson representative immediately.
- Do not dispose of batteries in a fire. The batteries may explode.
- Handle, transport and recycle batteries in accordance with local regulations.

**WARNING**

Risk of electric shock and fire. Can cause equipment damage, injury and death.

Although the SolaHD S5KC UPS has been designed and manufactured to ensure personal safety, improper use can result in electrical shock or fire. To ensure safety, observe the following precautions:

- Clean the UPS with a dry cloth. Do not use liquid or aerosol cleaners.
- Never block or insert any objects into the ventilation holes or other openings of the UPS.
- Do not place the SolaHD S5KC where it might be damaged.

**WARNING**

Risk of electric shock. Can cause equipment damage, injury and death.

This UPS contains no user-serviceable parts except for the user-replaceable module assemblies. The UPS On/Off push button does not electrically isolate internal parts.

All service and maintenance operations must be performed by properly trained and qualified personnel. Under no circumstances should unqualified or unauthorized personnel attempt to gain access to the internal portions of the SolaHD S5KC.



**ELECTROMAGNETIC COMPATIBILITY**—The SolaHD S5KC complies with the limits of Category C2, pursuant to IEC/EN/AS 62040-2, and for a Class A digital device, pursuant to Part 15 of FCC rules. Operation is subject to the following conditions:

- The output cables shall be no longer than 10m (32ft).
- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation. Operating this device in a residential area is likely to cause harmful interference that users must correct at their own expense.

The SolaHD S5KC complies with the requirements of EMC Directive 2004/108/EC and the published technical standards. Continued compliance requires installation in accordance with these instructions and use of accessories approved by Emerson.

Operate the UPS in an indoor environment only in an ambient temperature range of 0-40°C (32-104°F). Install it in a clean environment, free from moisture, flammable liquids, gases and corrosive substances.

Do not continue to use the UPS if the front panel indications are not in accordance with these operating instructions or the UPS performance alters in use. Refer all faults to your local service dealer.

Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from the batteries. Proper disposal of batteries is required. Refer to your local laws and regulations for disposal requirements.

Never block or insert any object into the ventilation holes or other openings.

DO NOT CONNECT equipment that could overload the UPS or demand DC current from the UPS, for example: electric drills, vacuum cleaners, laser printers, hair dryers or any appliance using half wave rectification.

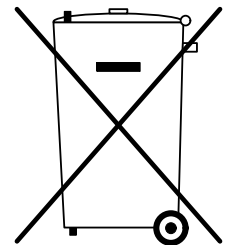
Storing magnetic media on top of the UPS may result in data loss or corruption. Turn Off and isolate the UPS before cleaning it. Use only a soft dry cloth; never use liquid or aerosol cleaners.

### Information for the Protection of the Environment

**UPS SERVICING**—This UPS makes use of components dangerous for the environment (electronic cards, electronic components). The components removed must be taken to specialized collection and disposal centers.

**NOTICE TO EUROPEAN UNION CUSTOMERS: DISPOSAL OF OLD APPLIANCES**—This product has been supplied from an environmentally aware manufacturer that complies with the Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/CE.

The crossed-out trash bin symbol at right is placed on this product to encourage users to recycle components and units whenever possible. Please be environmentally responsible and recycle this product through your recycling facility at its end of life. Do not dispose of this product as unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of waste electrical and electronic equipment (WEEE).

















For information regarding the scrapping/disposal of this equipment, please browse [www.solahd.com](http://www.solahd.com) (*Products* section or *Contact us* section) or call Emerson's worldwide technical support.

- Toll-Free in North America: 1-800-377-4384
- Outside North America: +1-847-268-6651
- Email: [solahd.technicalservices@emerson.com](mailto:solahd.technicalservices@emerson.com)



## GLOSSARY OF SYMBOLS

|   |   |
|---|---|
|    | Risk of electrical shock  |
|    | Indicates caution followed by important instructions            |
|    | AC input  |
|    | AC output   |
|    | Requests the user to consult the manual                         |
|    | Indicates the unit contains a valve-regulated lead acid battery |
|    | Recycle   |
|  | DC voltage  |
|  | Equipment grounding conductor                                   |
|  | Bonded to ground  |
|  | AC voltage  |
|  | Toggle between On and Off                                       |
|  | Standby   |
|  | Do not dispose of in normal waste stream                        |



## 1.0 PRODUCT INTRODUCTION

Congratulations on your purchase of the SolaHD S5KC Uninterruptible Power System (UPS). As with every other SolaHD product, we stand behind our quality. If you have any questions concerning this UPS, please feel free to contact your local dealer or SolaHD representative or call the appropriate Technical Support number listed on the back of this manual.

To ensure proper installation and operation of this unit, please read this manual thoroughly.

The installation must be completed by trained professionals and follow all local codes. General operation of the units can be conducted without any specialized training.

This chapter provides the system description, features, operating principle, operating mode, main components and specifications of the SolaHD S5KC UPS.

### 1.1 System Description

The SolaHD S5KC power system is a modular UPS designed to provide high reliability. It is intended for use with workstations, servers, networks, telecoms and other sensitive electronic equipment. It provides continuous, high-quality AC power to your equipment, protecting it from any power disturbance due to blackouts, brownouts, surges or noise interference.

The SolaHD S5KC UPS is an easily adaptable UPS system. By simply installing additional power or battery modules, you can expand your current system capacity, extend your backup runtime, or provide redundancy. The SolaHD S5KC UPS user interface enables the user to configure the operation according to application requirements. It also informs the user on the status of the UPS and keeps a log of events.

The SolaHD S5KC series UPS contains both transformer-free and transformer-based UPS frames. The use of the transformer-free or transformer-based frames is dependent upon the specific application requirements. The appearance of the different frames is shown in **Figures 1** through **4**.

**Table 1      Frame designation**

| UPS Model Number Digits 1-4 | Frame Type               | Frame Rating     |
|-----------------------------|--------------------------|------------------|
| S5KCA or S5KCE              | 10 Bay Transformer-free  | 15kVA redundant  |
| S5KCB or S5KCF              | 16 Bay Transformer-free  | 20kVA redundant  |
| S5KCC                       | 12 Bay Transformer-based | 15kVA redundant  |
| S5KCD                       | 16 Bay Transformer-based | 20 kVA redundant |



Figure 1 16-bay transformer-free UPS

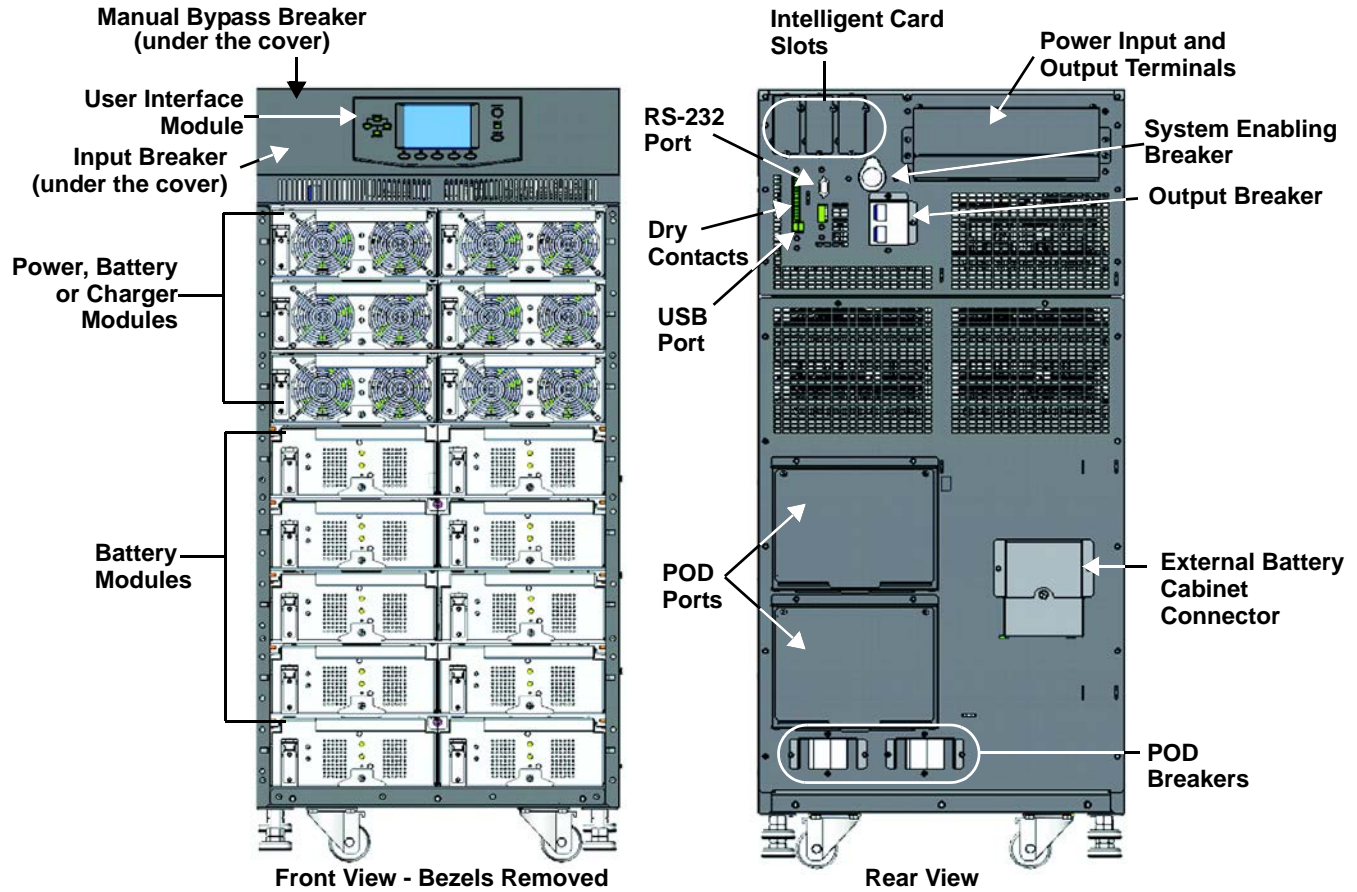


Figure 2 10-bay transformer-free UPS

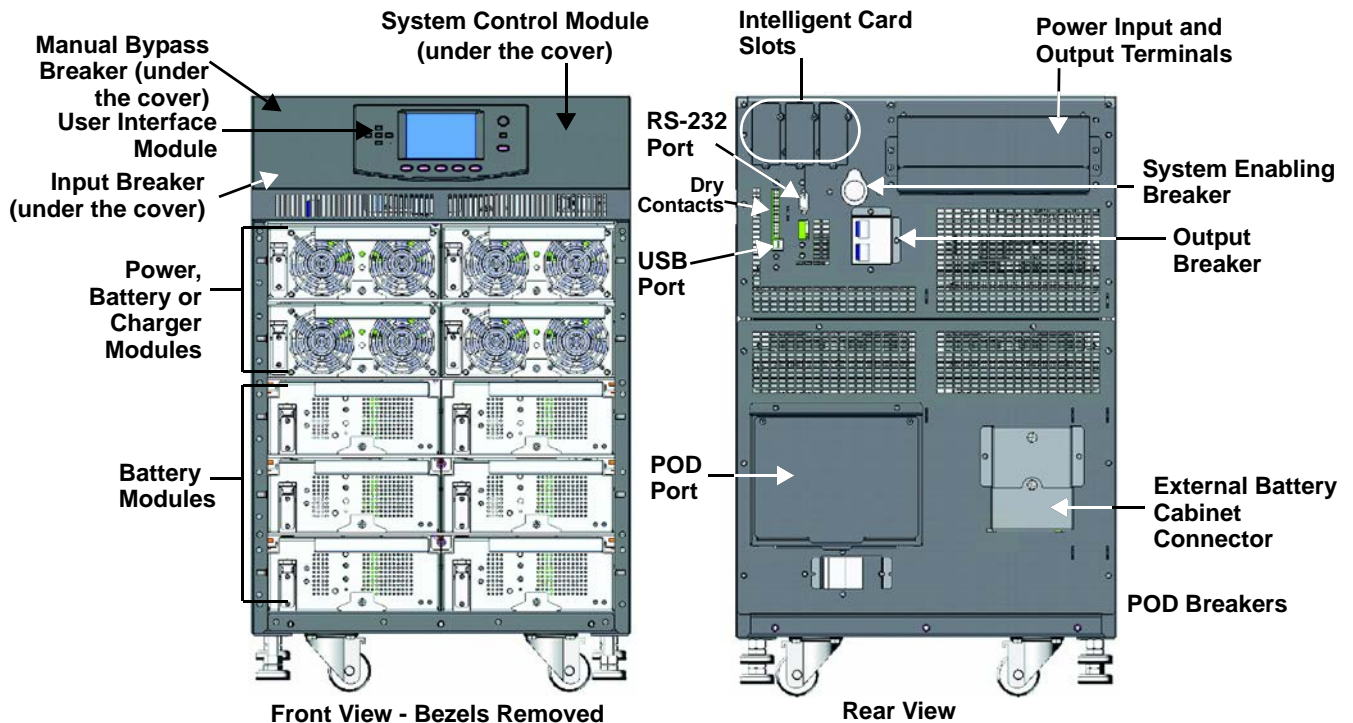
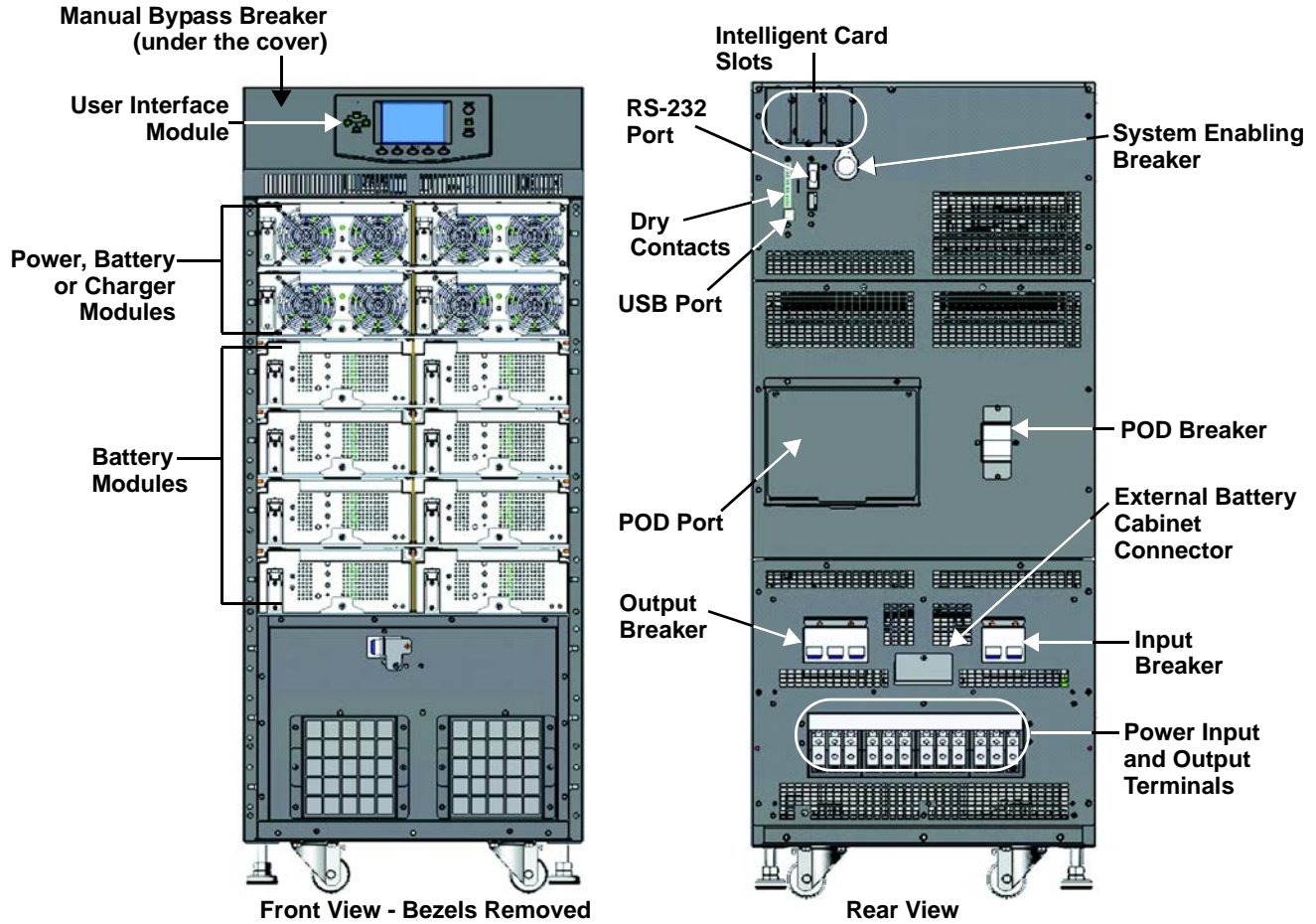


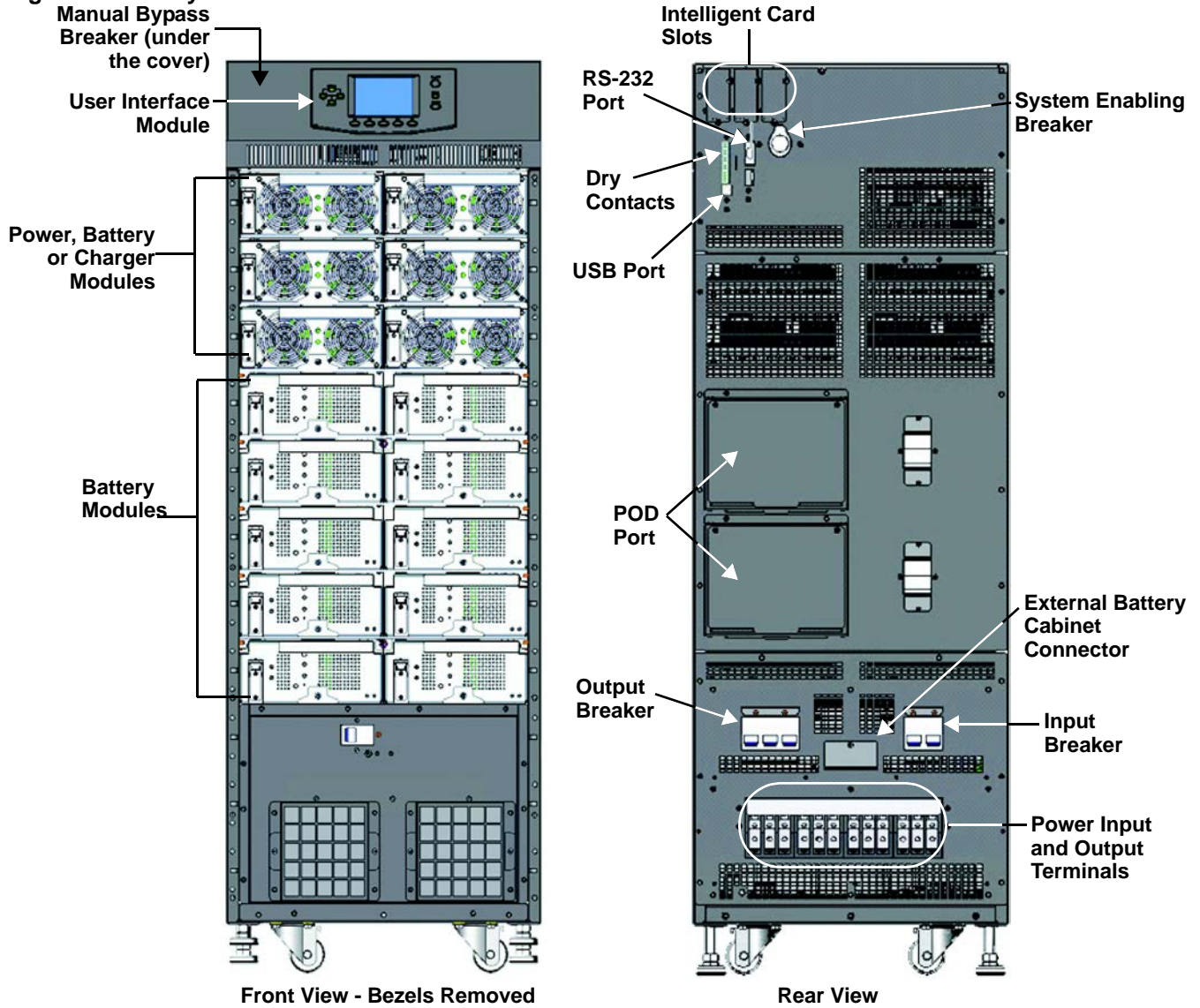


Figure 3 12-bay transformer-based UPS





**Figure 4 16-bay transformer-based UPS**





## 1.2 Features

### SolaHD S5KC UPS

- Flexible extension of capacity, up to 15 or 20kVA modular power, depending upon frame rating
- N + 1 redundancy, improving availability
- Module design, modules hot-swappable by user
- Redundant intelligent module, providing redundant communication path
- Intelligent battery management
- External large battery assemblies can be connected
- Internal automatic and manual bypass
- Transformer-based UPS frames provide output isolation transformer
- Optional 10A battery charger module
- Continuous system monitoring
- User-friendly interface with audible alarms and event logs
- Supporting hot-pluggable and online update
- Compatible with backup generators

### Standard Components

- UPS frame
- User interface module: for comprehensive user indications and programmable controls
- System control modules and system monitor module: for system monitoring and communications
- Power modules: for power conditioning
- Battery modules: for backup power
- Charger module: option for charging batteries and long run time applications
- External battery cabinet: extends system run time

### Communications

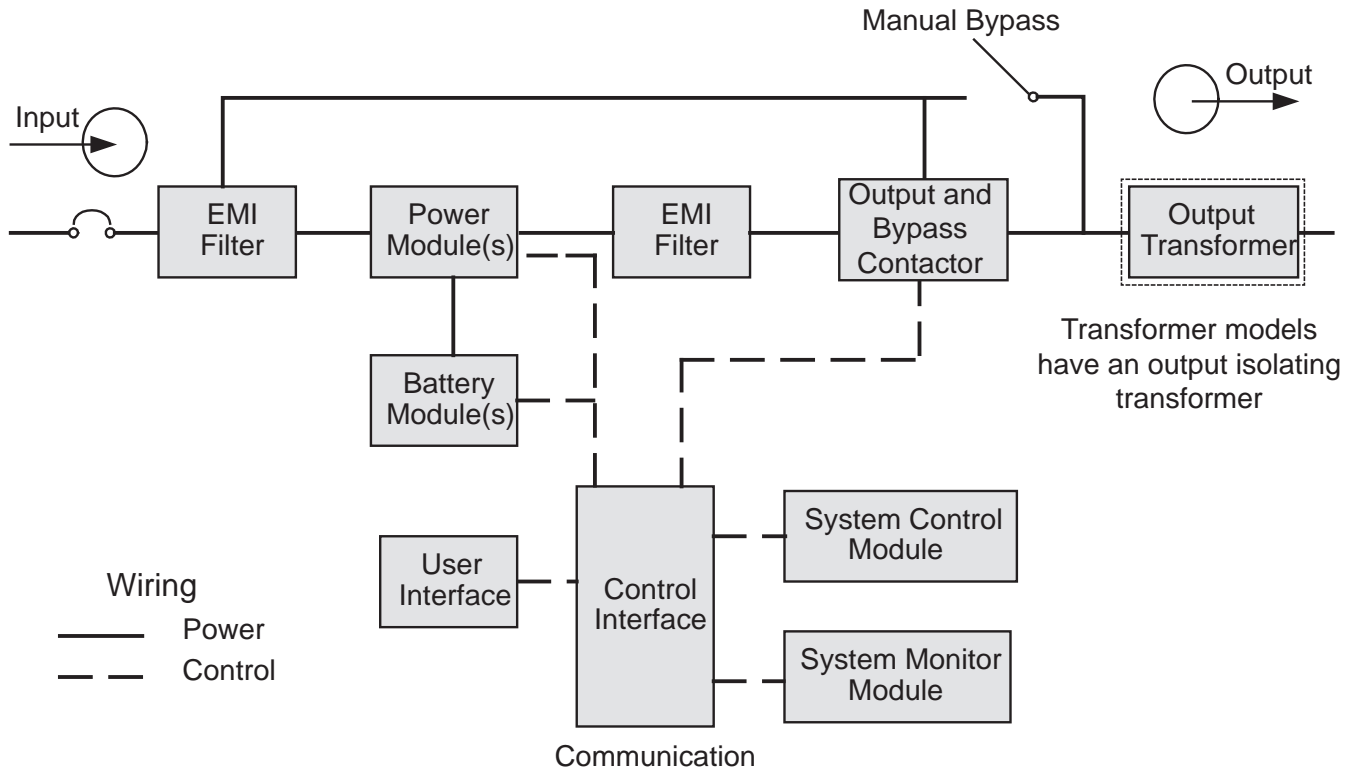
- Dry contacts
- IntelliSlot® communication ports
- USB port



### 1.3 Operating Principle

The operating principle of the SolaHD S5KC UPS is shown in **Figure 5**.

**Figure 5 Operating principle diagram**



The SolaHD S5KC UPS is composed of AC input, EMI filter, power module(s), battery module(s), user interface, control interface, system control module, output and bypass contactor, manual bypass, output transformer (certain frames only) and AC output.



## 1.4 Operating Modes

The SolaHD S5KC UPS is a true online double-conversion system, having the following operating modes:

- Normal Mode
- Backup Mode
- Auto Restart Mode
- Bypass Mode

### Normal Mode

The power module rectifiers derive power from a utility AC source and supply regulated DC power to the inverter. The module's inverter regenerates precise AC power to supply the connected equipment. The battery charger is in the power module and maintains a float-charge on the batteries of the UPS; additionally, the optional charger module can also charge the batteries to maintain a quicker recharge time for long backup time applications.

### Backup Mode

When AC utility fails, the connected equipment is supplied power by the inverter, which obtains energy from the battery modules. The output power will not be interrupted during the failure or restoration of the AC utility/mains source.

### Auto Restart Mode

After a power outage and complete battery discharge, and once AC utility is restored, the UPS will automatically restart and resume supplying power to connected equipment. This feature is enabled at the factory, but can be disabled by the user. The user can also program two auto restart delay settings from the LCD:

- Battery capacity level (%)
- Countdown timer

### Bypass Mode

The bypass provides an alternate path for power to the connected equipment and operates in the following manner:

- Automatic: In the event of an internal fault or should the inverter overload capacity be exceeded, the UPS performs an automatic transfer of the connected equipment from the inverter to the bypass source.
- Manual: Should the UPS need to be taken out of service for limited maintenance or repair, manual activation of the bypass will cause an immediate transfer of the equipment from the inverter to the bypass source.



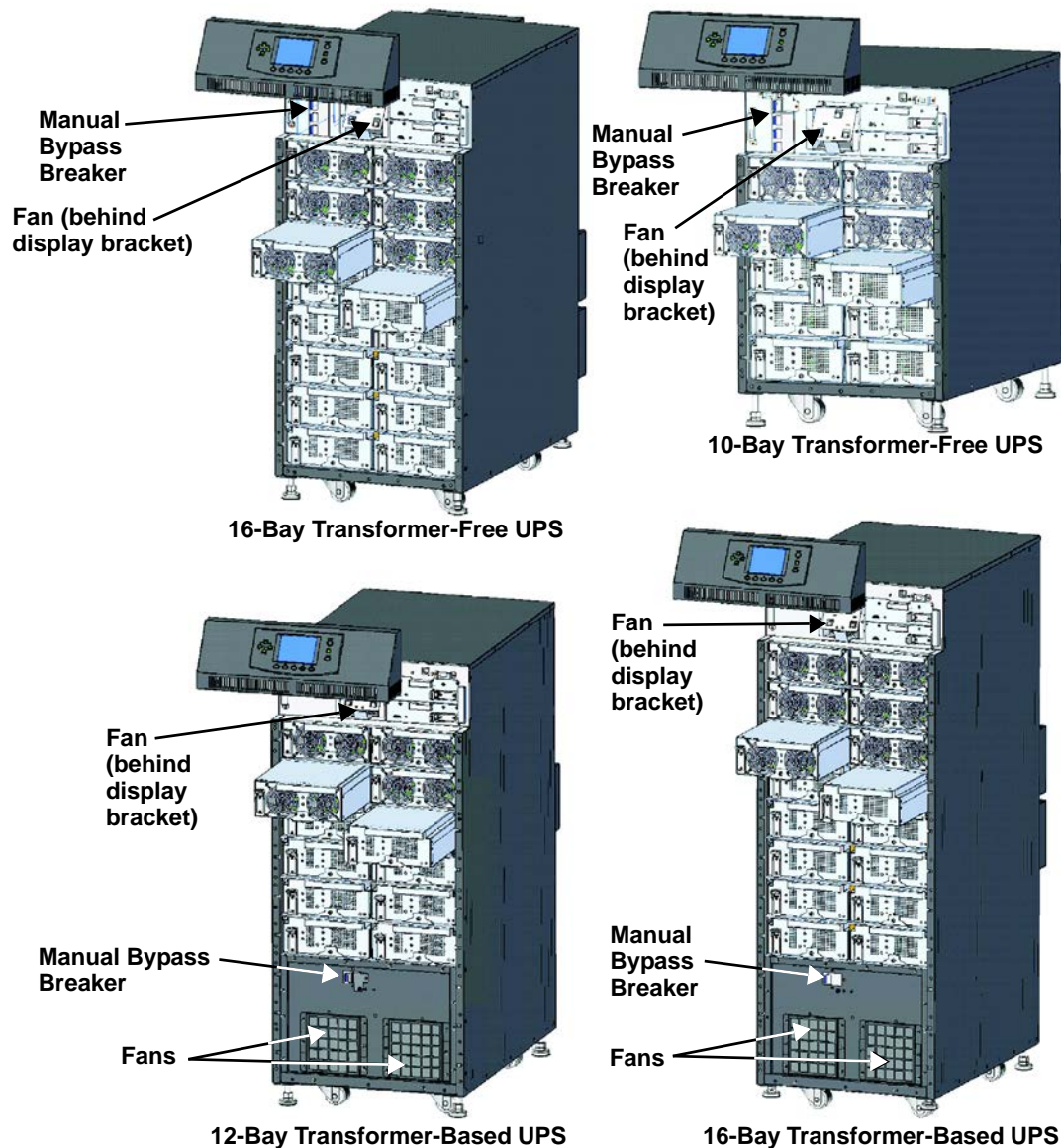
## 1.5 Major Components

This section provides a general description of each component and its functions. Please review this section carefully, as it will give you a better understanding of how the UPS operates.

### 1.5.1 UPS Frame

The UPS frames are shown in **Figure 6**.

**Figure 6** UPS frames, bezels removed



#### NOTE

*In **Figure 6**, the power module and battery module are extended for illustration purposes only. Extending more than one module at a time could cause the unit to tip over.*

All UPS components are located in the SolaHD S5KC frame. The front of the UPS consists of a series of metal bezels. By grasping these bezels from the sides and pulling straight out, you can remove the bezel to reveal the battery/power module bays. The standard-model frame provides cooling fans and a manual bypass breaker on its top; the transformer-model frame provides a manual bypass breaker on its bottom and fans on both top and bottom. The user interface module is located above the power/battery module bays for easy access, operation and for viewing UPS operating information. On the lower right part of the user interface module, you will see the system control module bays.



### 1.5.2 User Interface Module

The user interface module is shown in **Figure 7**.

**Figure 7 User interface module**



The user interface module is the primary source of communication between the UPS and the user. The user interface module permits:

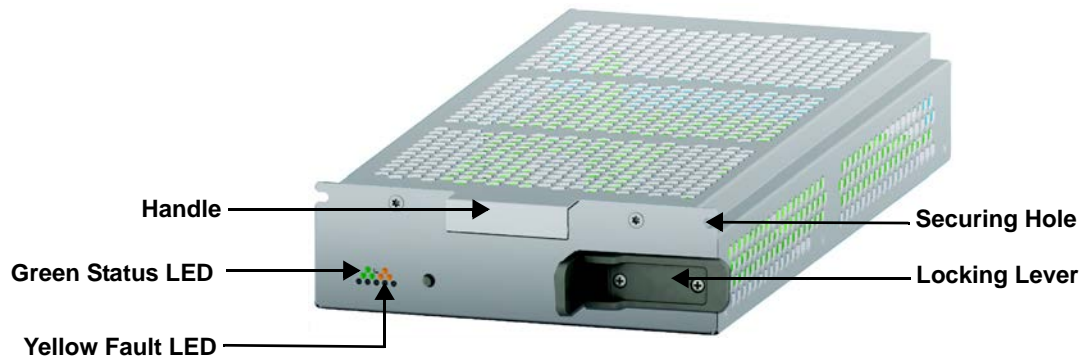
- Viewing the UPS status
- Configuring the system
- Reviewing the event log
- Silencing the audible alarm

Refer to **4.0 - Operation and Display Panel** for details on operating the user interface module.

### 1.5.3 System Control Module and System Monitor Module

The system control module and the system monitor module are the communication backbone of the UPS. They gather input from all modules and process the data to control the operation of the system, including monitoring the condition of each module. Except for the silkscreen, the appearance of the system control module and the system monitor module is as shown in **Figure 8**.

**Figure 8 SolaHD S5KC system control module and the system monitor module**



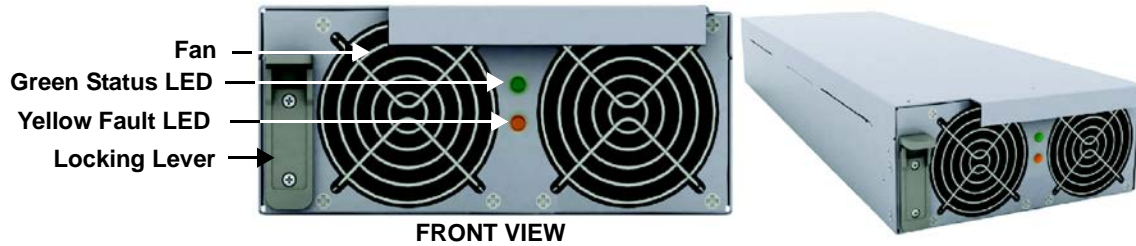
Under normal operation, the green status LED will blink and the yellow fault LED will be Off. For any other condition, refer to **5.0 - Troubleshooting**.



### 1.5.4 Power Module

The power module is shown in **Figure 9**.

**Figure 9 SolaHD S5KC power module**



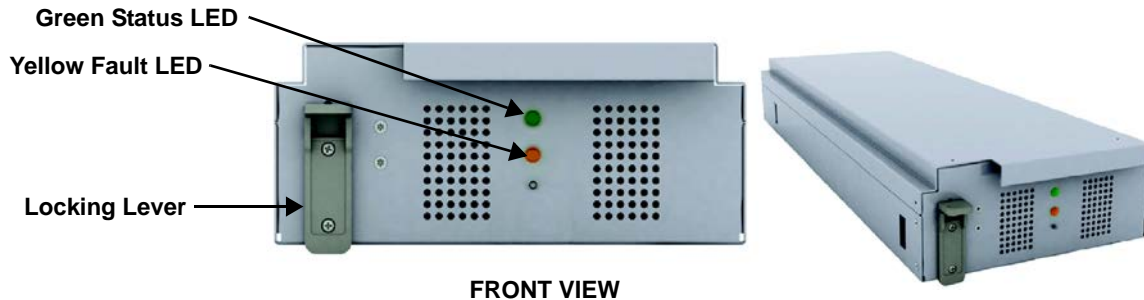
Each power module is an independent 5kVA unit, consisting of a power factor corrected rectifier, battery charger and inverter, with associated monitoring and control circuitry. The modules are connected in parallel for greater capacity and/or redundancy.

The power modules may be added or replaced on-line with no interruption or danger to the connected equipment or user.

### 1.5.5 Battery Module

The battery module is shown in **Figure 10**.

**Figure 10 Battery module appearance**



When AC utility fails, the battery module will supply power to the load. Each battery module contains six individual 12V, valve-regulated lead-acid (VRLA) battery blocks. Two battery modules are connected in series to form a battery string.

Each battery module has monitoring and controls to isolate the battery module in the event of a battery failure. The battery strings are connected in parallel to provide backup time and/or redundancy.



#### NOTE

*Two battery modules must be installed in the same row to make a complete battery string.*

The battery modules may be added or replaced on-line with no interruption or danger to the connected equipment, provided that the UPS is not operating on battery.

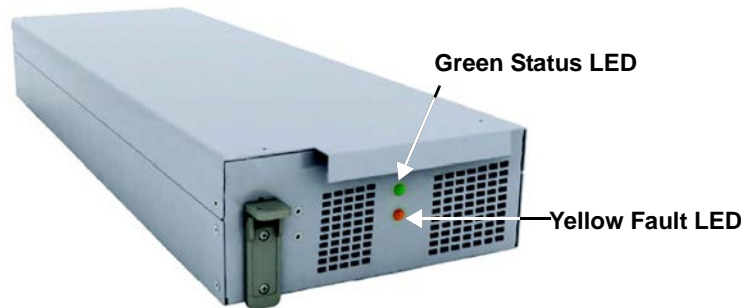
Under normal operation, the green status LED will blink continuously and the yellow fault LED will be Off. For any other condition, refer to **5.0 - Troubleshooting**.



### 1.5.6 Charger Module

Figure 11 shows the charger module.

Figure 11 Appearance of the charger module



In AC mains mode, the charger module charges the system battery modules or external battery cabinet. Each charger module is rated to deliver 10A charging current. The charger module has an independent control function and maintains real-time communication with the system and the battery modules to ensure stable charging and fault protection.

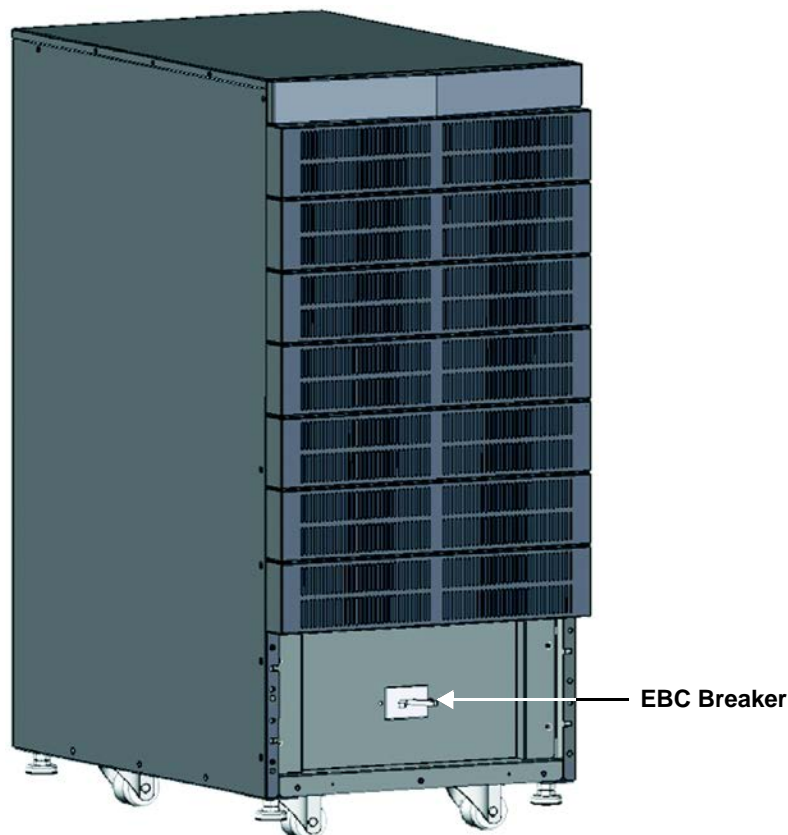
The charger module may be added or replaced on-line with no interruption or danger to the user, connected battery system or connected equipment.

### 1.5.7 External Battery Cabinet (EBC)

The external battery cabinet is divided into nine rows: the upper seven rows are for use with the intelligent battery modules, and the lower two are used for overcurrent protection for each battery cabinet. For normal operation, two battery modules must be inserted in the same row of the frame to create a complete string. The battery module strings work in parallel to provide longer backup time for the UPS. A SolaHD S5KC can be configured with, at most, four external battery cabinets.

An external battery cabinet is shown in Figure 12.

Figure 12 External battery cabinet





## 2.0 INSTALLATION

This chapter describes UPS installation, including installation preparation, unloading the UPS, mechanical installation, installing modules and cable connection.

### 2.1 Unpacking Inspection

Upon receiving the UPS, uncrate it and conduct the following checks:

- Inspect the UPS appearance for shipping damage. Report any shipping damage to the carrier and send a copy to your Emerson® representative.
- Check against the delivery list to ensure that the package contains the correct number and type of accessories. If there is any discrepancy, contact the distributor immediately.

#### 2.1.1 Installation Environment



##### NOTE

*Operating the UPS in temperatures above 77°F (25°C) will reduce battery life.*

The UPS environment must be free of conductive contaminants and excessive moisture (water and condensation), flammable vapors, chemical fumes, corrosive gases and liquids.

#### 2.1.2 Installation Tools

The tools required to properly set up your UPS are listed below:

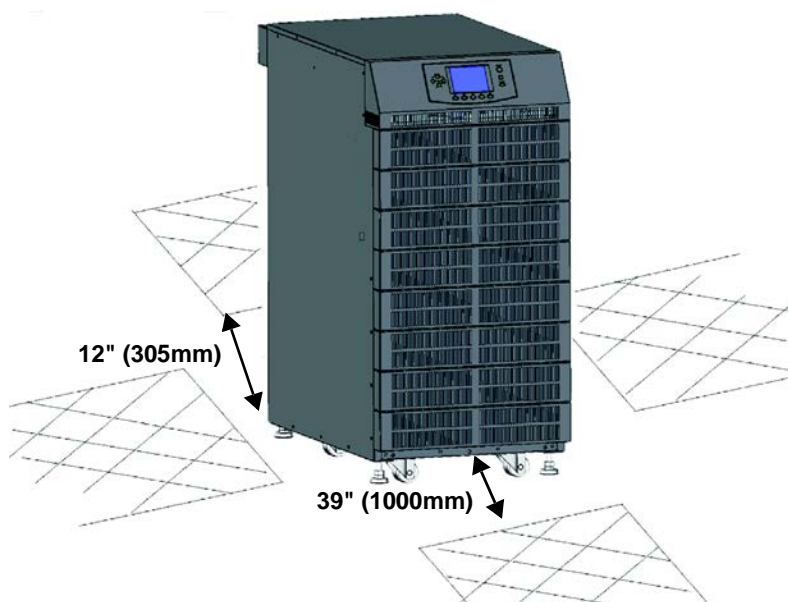
- Pallet jack
- 17mm (11/16") wrench or socket
- 13mm (1/2") wrench or socket
- 10mm wrench or socket
- #1 and #3 Phillips screwdrivers
- Torque wrench

#### 2.1.3 Installation Site

Consider the weight and size of the SolaHD S5KC when deciding where to install the unit. Verify that the floor can support the weight of a fully loaded unit, any accessories and external cabinets.

Verify that the UPS will be in a well-ventilated area with at least 12 inches (305mm) clearance behind it. The UPS is air-cooled, utilizing internal fans. Air is drawn into the front of the UPS and is exhausted through ventilation grilles in the back. The UPS should also have at least 39 inches (1m) clearance in front for service and to meet many local and national building codes.

**Figure 13 Front and rear installation clearances**





## 2.2 Unloading the UPS

The unit frame is bolted to the shipping pallet to ensure safety during shipping. Emerson recommends keeping the unit bolted to the pallet and using a pallet jack to transport the unit to its installation location.



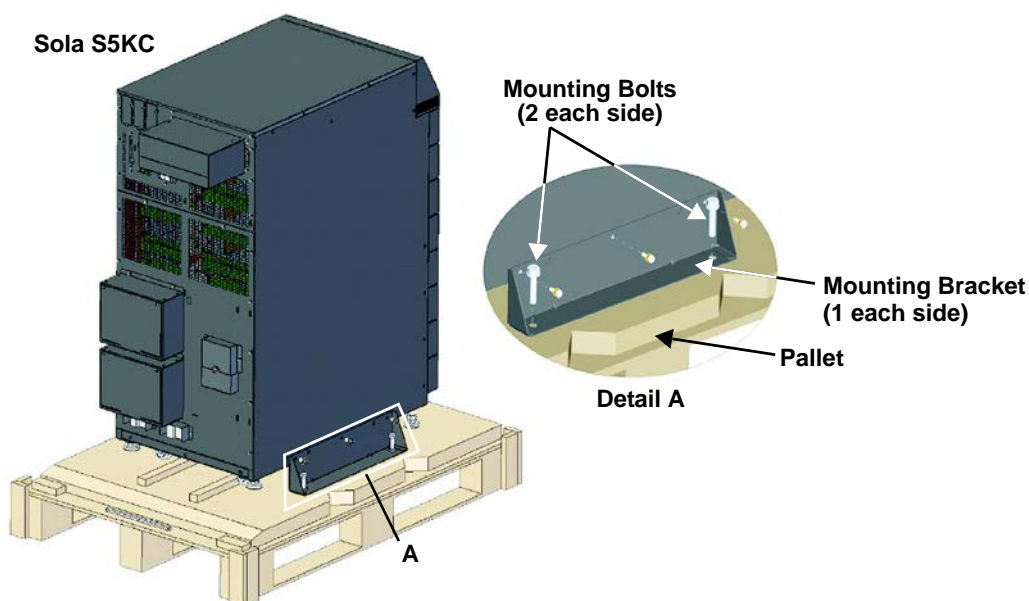
### NOTE

*This UPS is very heavy. At least two people should assist in unloading it from the pallet.*

To unload the UPS:

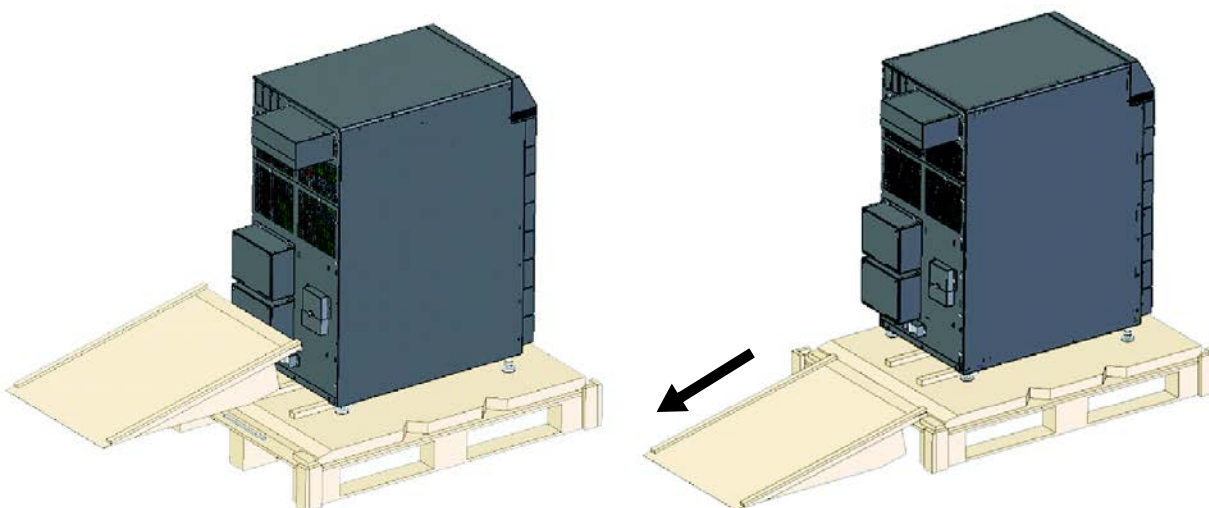
1. Move the UPS to its installation site and remove the package paper.
2. Use a 17mm (11/16") wrench, to remove the four mounting bolts from the pallet brackets (see **Figure 14**).
3. Remove the mounting brackets from the UPS with a 10mm wrench or socket or a #3 Phillips screwdriver.

**Figure 14 Remove the mounting brackets**



4. Raise the four leveling feet to provide clearance between the pallet and the UPS frame.
5. Connect the ramp to the UPS pallet, as shown in **Figure 15**.
6. Roll the UPS slowly down the ramp until it is on a level surface, as shown in **Figure 15**.

**Figure 15 Connect the ramp and remove UPS**





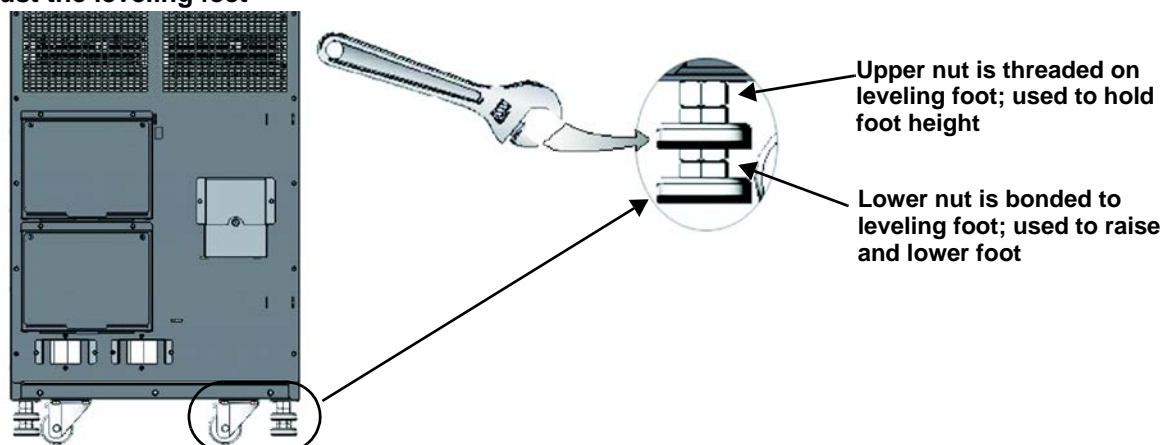
## 2.3 Mechanical Installation

Two installation modes are available for the SolaHD S5KC UPS: tower installation and rack installation.

### 2.3.1 Tower Installation

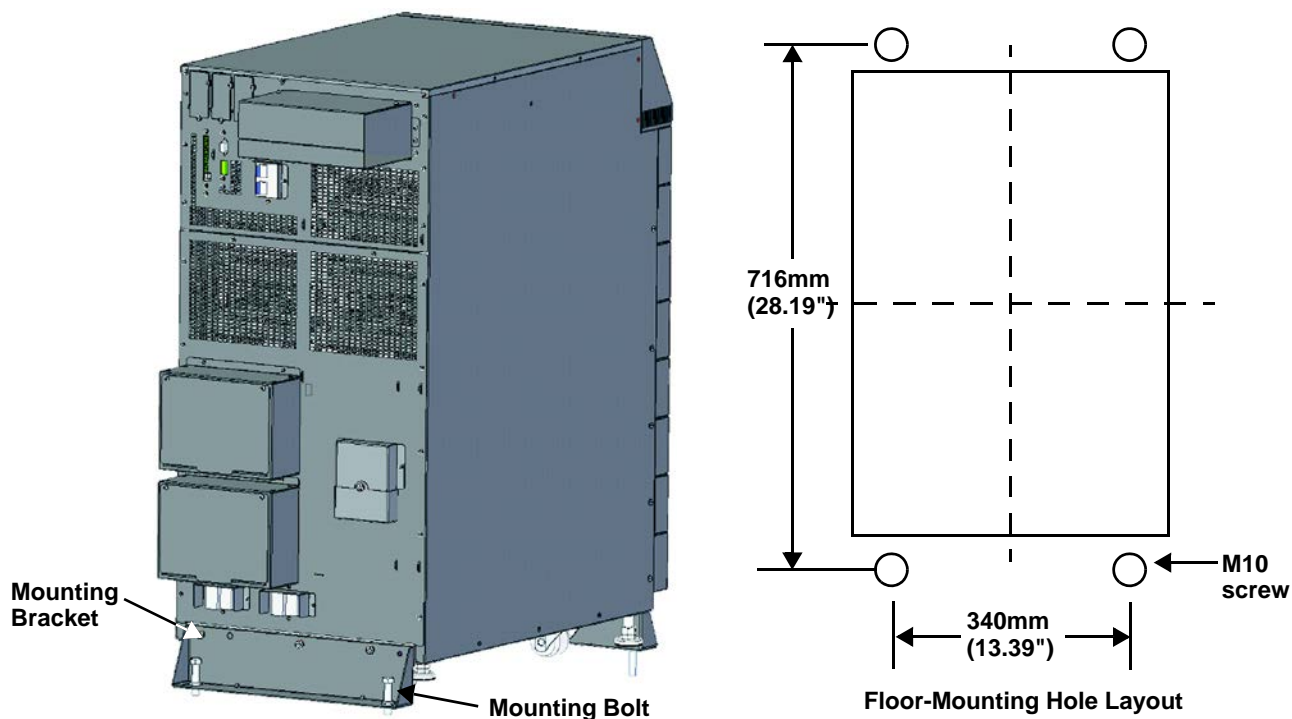
1. Once the UPS is in the desired location, adjust the leveling feet to secure its position, as shown in **Figure 16**.
  - a. Use an open end wrench to turn the lower nut to raise or lower the leveling foot.
  - b. After the unit is level, tighten the upper nut against the frame to prevent the height from changing.

**Figure 16 Adjust the leveling feet**



2. For added stability or earthquake-resistant installations, the shipping brackets can be used to secure the unit to the floor.
  - a. Drill holes 10.3mm (13/32") in the floor for stationary mounting; these will accommodate the mounting bolts removed from the pallet. Refer **Figure 17** for the layout.
  - b. Use the mounting screws to install the mounting brackets on the front and rear of the UPS.
  - c. Secure the mounting brackets to the floor with the mounting bolts (see **Figure 17**).  
For greater stability, use a higher-grade bolt.

**Figure 17 Installation position and drilling hole dimensions for stationary mounting**

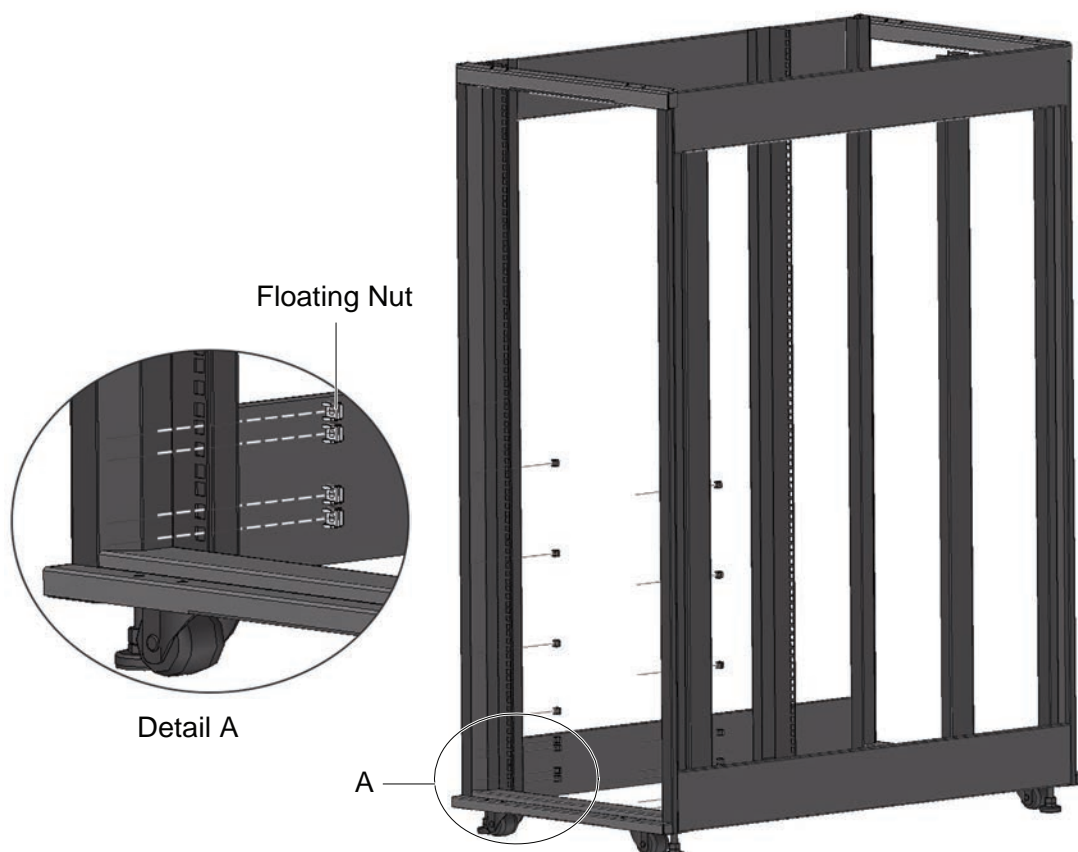




### 2.3.2 Rack Installation

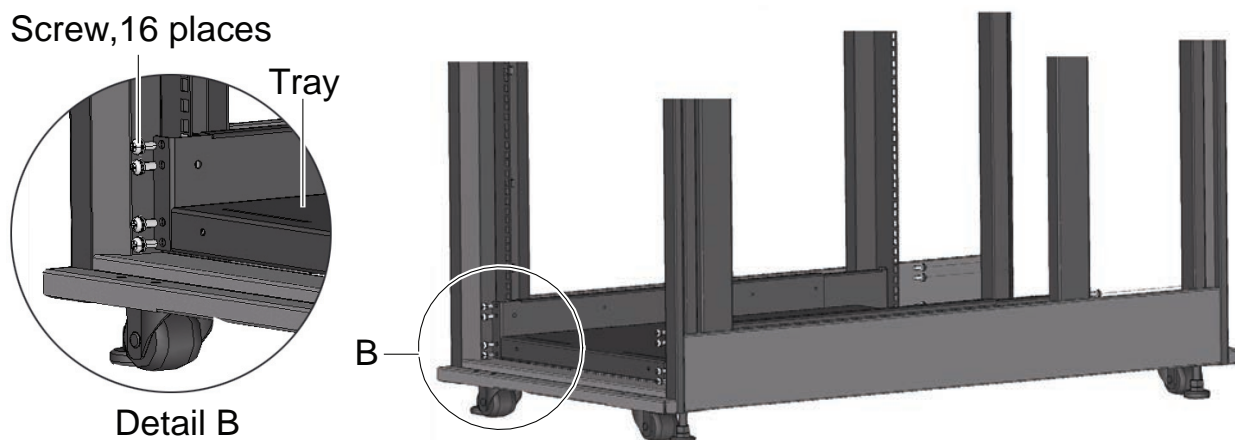
1. Install the cage nuts on the corresponding positions in the rack, as shown in **Figure 18**.
  - a. Install cage nuts in the two lower square holes of 1U space and in the two upper square holes of 2U space of all four rack posts. These cage nuts will secure the optional shelf that will support the weight of the SolaHD S5KC.
  - b. Install a cage nut in the middle square hole of 4U, 6U, 10U, 12U spaces, respectively, again in all four posts. The cage nuts will help secure the UPS in the rack.

**Figure 18** Install cage nuts



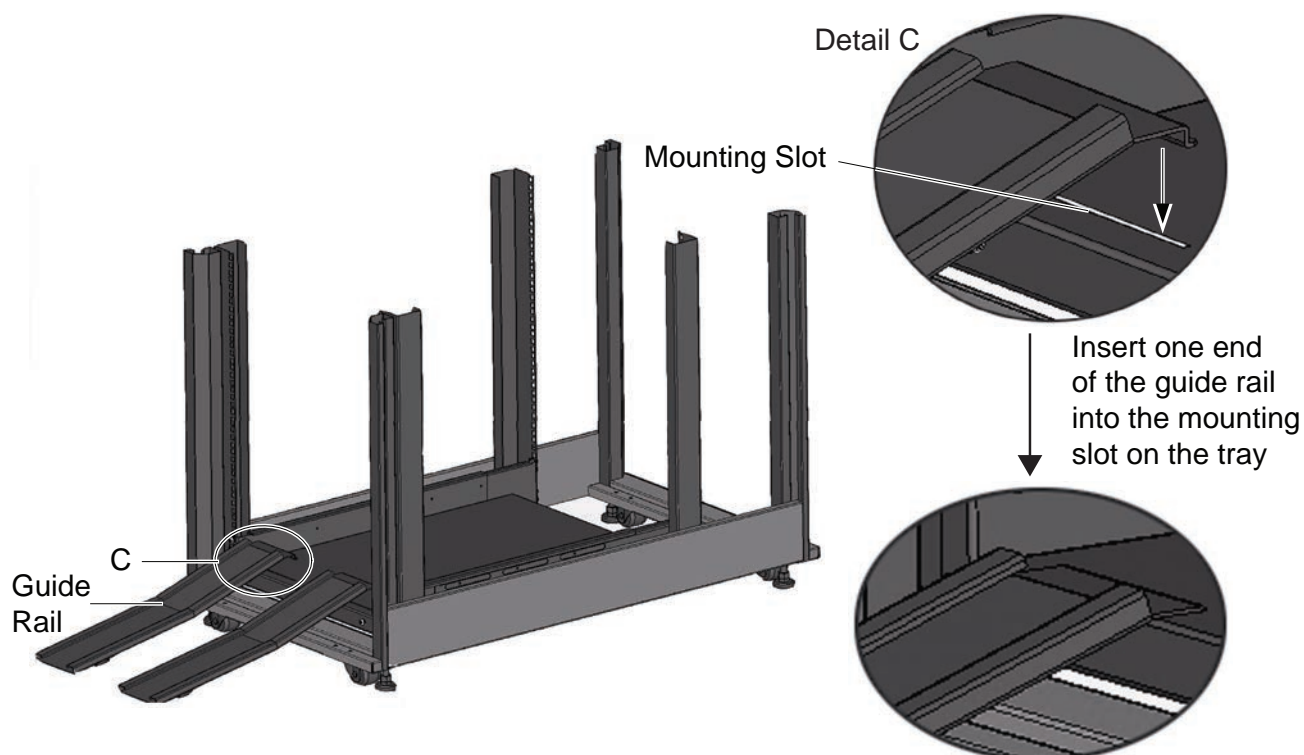
2. Install the rack-mount shelf on the corresponding position between 1U space and 2U space on the bottom of the rack, as shown in **Figure 19**.

**Figure 19** Install the tray

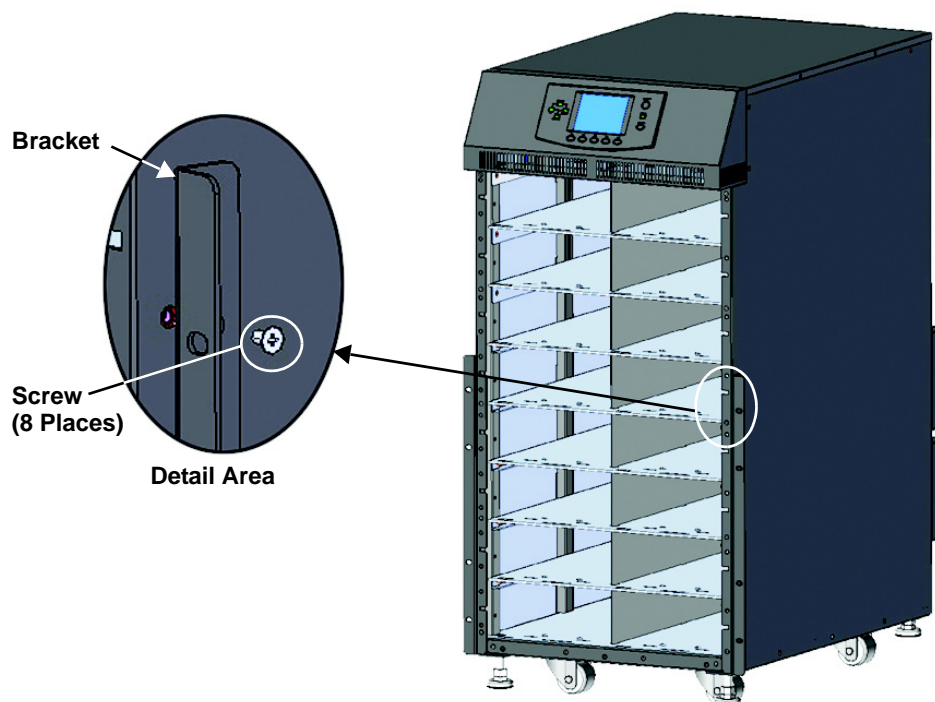


3. Install the guide rails (ramp) in the mounting slot at the front of the tray, as shown in **Figure 20**.



**Figure 20 Install the guide rails**

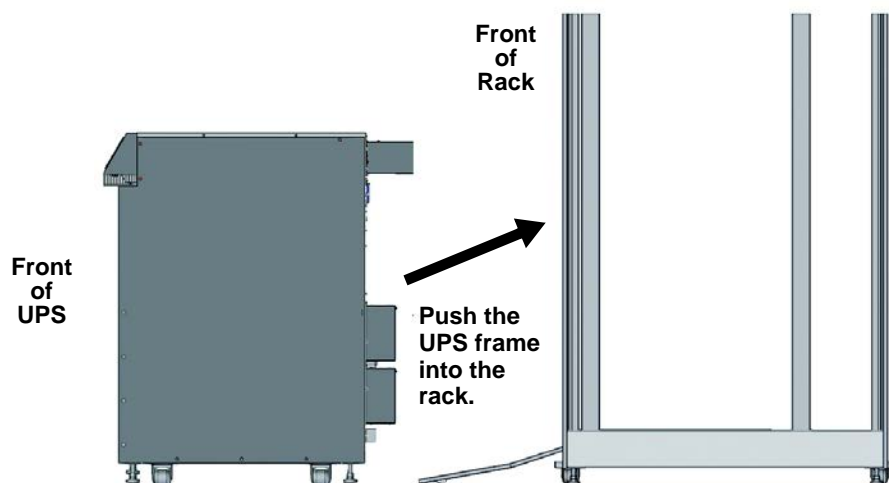
4. Unscrew the 10 screws on the front of the two side panels of the UPS frame.
5. Use those screws to attach the brackets to each side of the UPS frame, as shown in **Figure 21**.

**Figure 21 Install the brackets**



6. Push the SolaHD S5KC frame slowly into the enclosure from the front, as shown in **Figure 22**. The rear of the UPS goes into the rack first when installing through the front of the rack.

**Figure 22 Push the UPS frame into the rack**



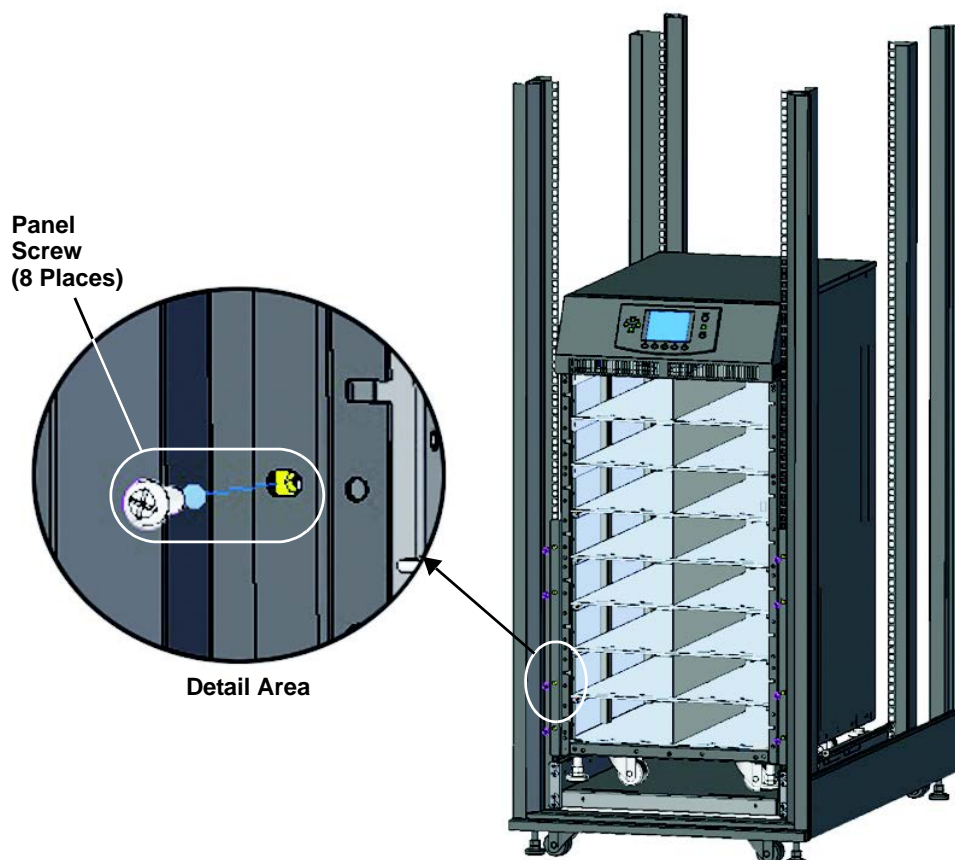
7. Use eight panel screws to secure the UPS frame to the rack posts, as shown in **Figure 23**.



**NOTE**

*It might be necessary to use the leveling feet to get the holes to align*

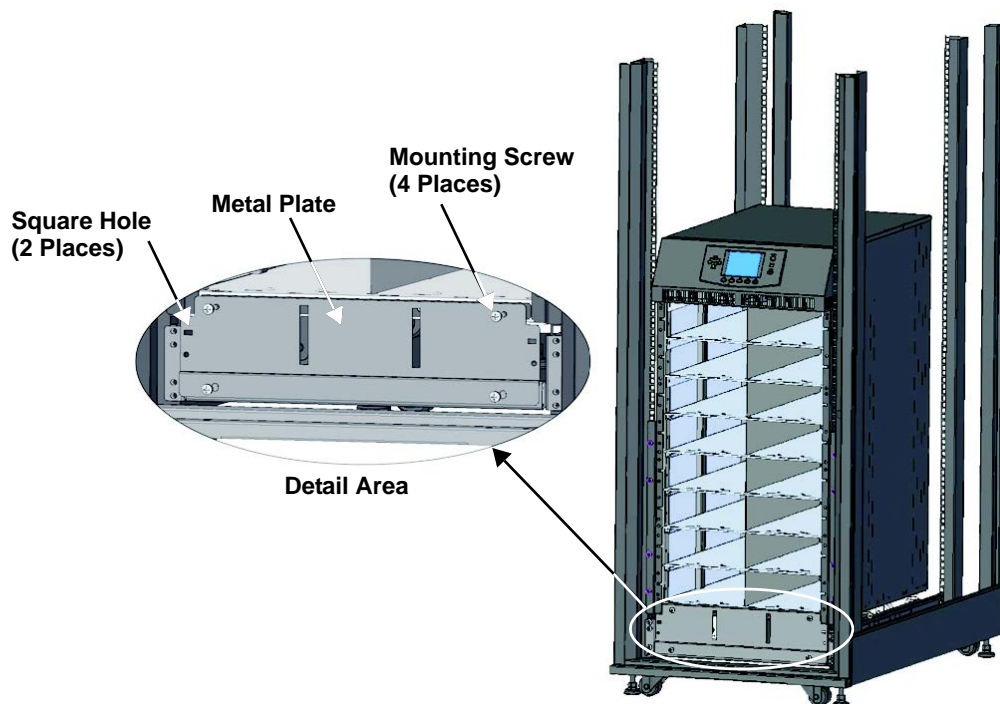
**Figure 23 Fix the UPS frame**





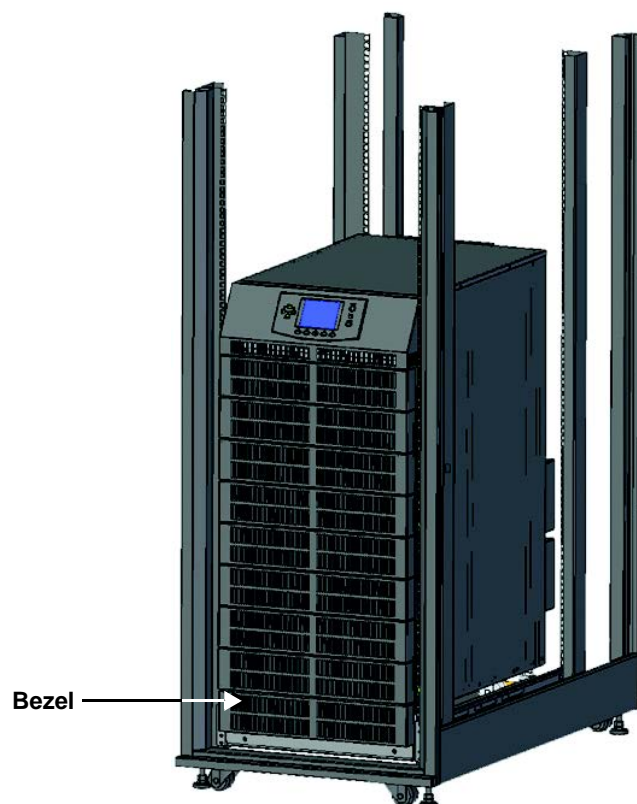
8. Use four screws to install the metal plate (accessory in the rack-mount kit) on the corresponding position on the lower front part of the UPS frame
9. Insert the provided bezel into the square holes of the metal plate, as shown in **Figures 24** and **25**.

**Figure 24** Install the metal plate



The installation is complete, as shown in **Figure 25**.

**Figure 25** Installation completed





## 2.4 Module Installation

The SolaHD S5KC ships from the factory configured (modules prepopulated) and tested as a system to the customer's requirements. If any modules were removed to facilitate ease of installation, follow the steps below to reinsert them properly.

### 2.4.1 Installing Power Module, Battery Module and Charger Module

1. Lift module to appropriate bay, resting end of module on bay shelf.



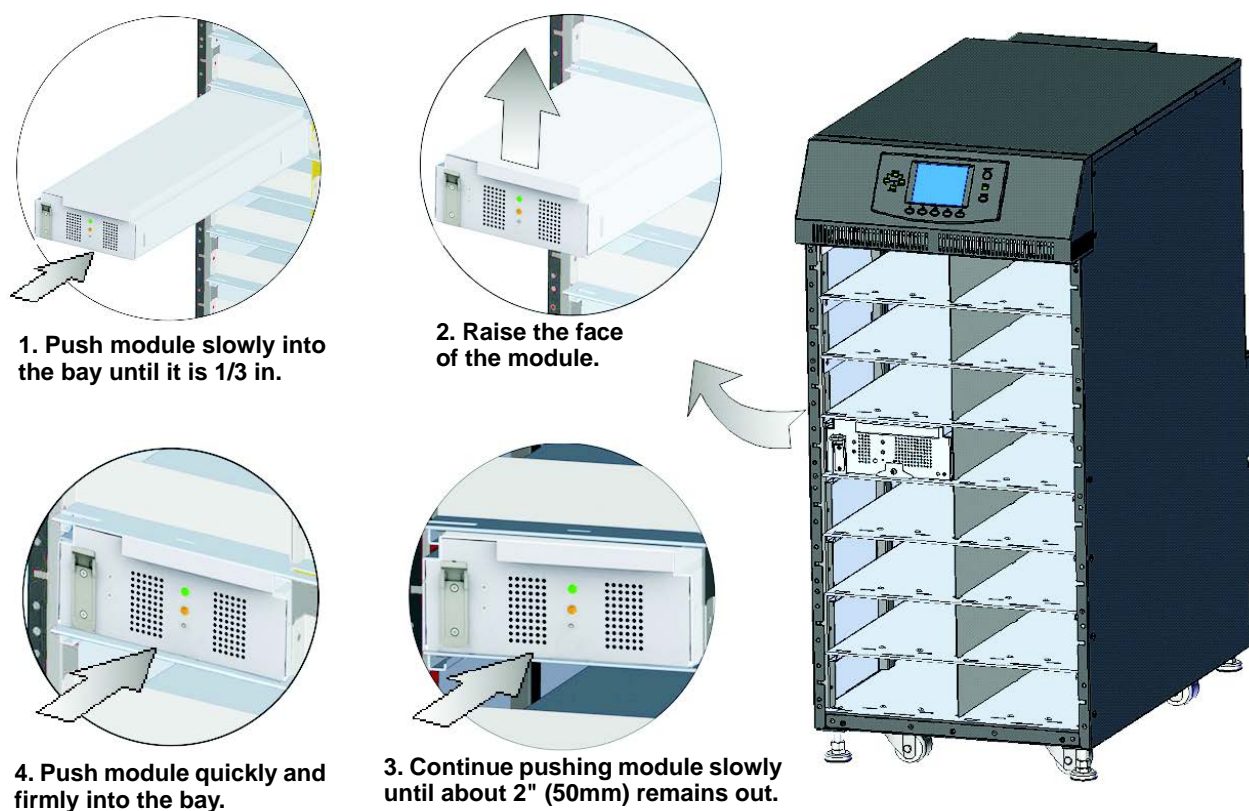
#### NOTE

*Use caution not to rest the module on any of the bezels, this could damage the bezel.*

*Two battery modules must be installed in the same row to complete the battery string.*

2. Push the module into the bay slowly. The module will be locked until 1/3 is in.
  - a. At this point, lift the module up and continue pushing it until about 5cm of the module is still out of the bay.
  - b. Push it firmly and smoothly to ensure that the module is fully inserted, as shown in **Figure 26**.

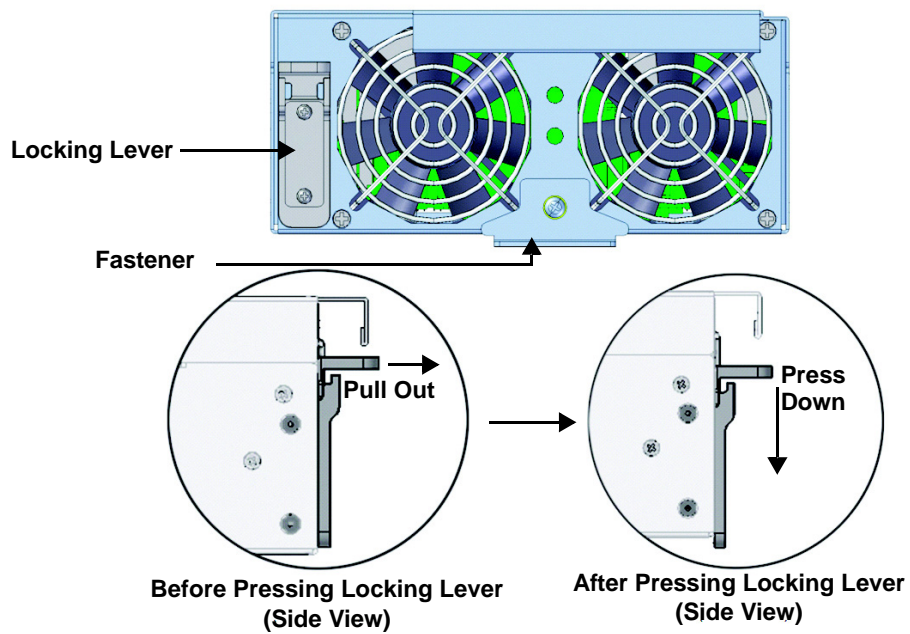
**Figure 26** Insert the power module, battery module and charger module



3. Use a #2 Phillips screwdriver to install the module-securing bracket, and then press the lever down into the bracket, as shown in **Figure 27**.



Figure 27 Lever and fastener

**NOTE**

*If the lever of the module cannot be pressed down smoothly, remove the module and reinstall it.*

4. Replace the small bezels.



## 2.4.2 Installing System Control and System Monitor Modules

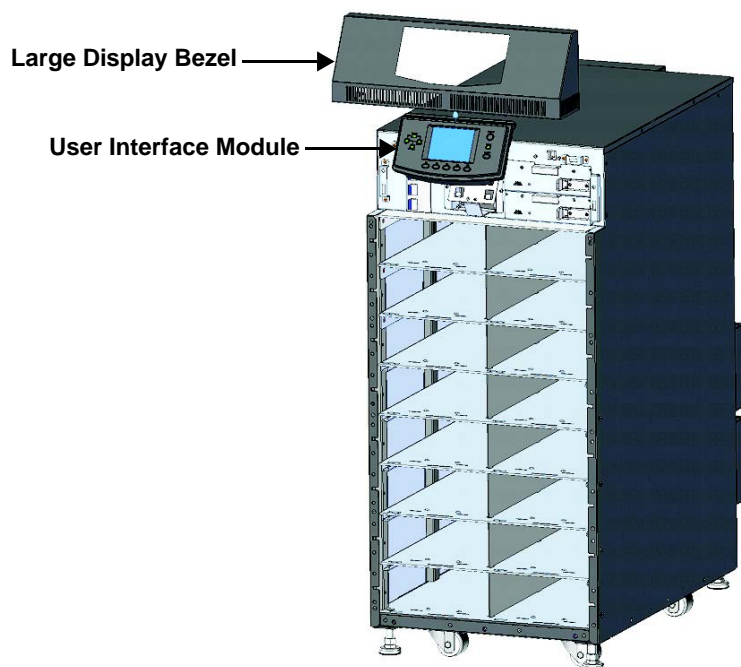
### NOTICE

Risk of unintended shutdown. Can cause equipment damage.

Do not remove both the control and the monitor modules at the same time. Removing both the control module and monitor module at the same time will cause the UPS to shut down and remove power from the load. Replace these modules one at a time.

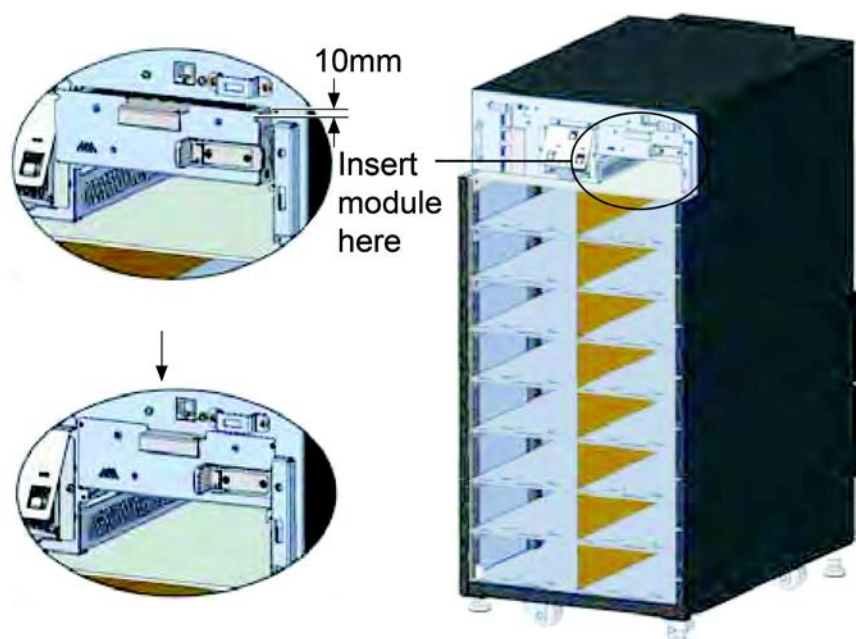
1. Remove the display bezel and the user interface (LCD) module on top of the frame, as shown in **Figure 28**.

**Figure 28 Remove large display bezel and user interface module**



2. Push the module slowly until about 1cm of the module is still out of the bay, and then press it firmly to ensure that the module is fully inserted, as shown in **Figure 29**.

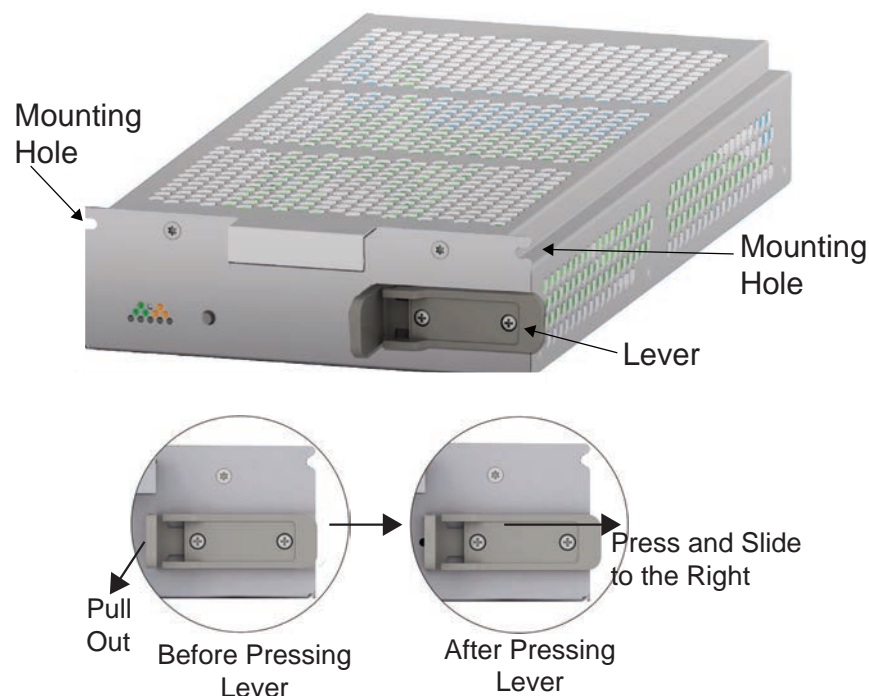
**Figure 29 Insert the System Control and System Monitor module**





3. Use a #2 Phillips screwdriver to install the screws into the holes on each end.
4. Slide the lever toward the right, as shown in **Figure 30**.

**Figure 30 Lever and fastener on System Control and System Monitor Module**



5. Replace the LCD module and display bezel.

## 2.5 Cable Connection



### WARNING

Risk of electric shock. Can cause injury or death.

Disconnect local and remote power supplies before working within.

Read this section thoroughly before attempting to install wiring to this unit.

Ensure that all the UPS input sources are disconnected off before attempting to install wiring to this unit.

This UPS cables should be connected by a properly trained and qualified electrician.

Refer to the unit model number in **Table 2** to determine which instructions to use for installation.

**Table 2 Cable connection method reference**

| UPS Model #<br>Digits 1-4 | Frame Type               | Manual<br>Section |
|---------------------------|--------------------------|-------------------|
| S5KCA                     | 10 Bay Transformer-free  | 2.5.1             |
| S5KCB                     | 16 Bay Transformer-free  | 2.5.1             |
| S5KCC                     | 12 Bay Transformer-based | 2.5.2             |
| S5KCD                     | 16 Bay Transformer-based | 2.5.2             |
| S5KCE                     | 10 Bay Transformer-free  | 2.5.3             |
| S5KCF                     | 16 Bay Transformer-free  | 2.5.3             |



## 2.5.1 Transformer-Free UPS Cable Connection

A junction box is factory-installed on each model of the SolaHD S5KC to ease cable connection.

Select the appropriate input cables according to **Table 3** and **Table 4** based on the UPS rating and mains frequency; however, it is recommended that you size the over current protection and wiring for the frame rating to easily allow upgrades to the UPS system.

**Table 3 Input cable selection list—60Hz**

| Maximum System Rated Load | Input voltage - 200VAC      |  | Input voltage - 208VAC      |  | Input voltage - 240VAC      |  |
|---------------------------|-----------------------------|--|-----------------------------|--|-----------------------------|--|
|                           | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker |
| 5kVA                      | 27A                         | 50A  | 26A                         | 50A  | 23A                         | 50A  |
| 10kVA                     | 53A                         | 63A  | 51A                         | 63A  | 45A                         | 63A  |
| 15kVA                     | 80A                         | 100A   | 77A                         | 100A   | 67A                         | 100A   |
| 20kVA                     | 106A                        | 125A   | 102A                        | 125A   | 90A                         | 125A   |

The power input and output terminals accept a maximum cable cross-sectional area of 35mm<sup>2</sup> (2AWG); the minimum cable cross-sectional area is 16mm<sup>2</sup> (6AWG); the rated torque is 4.52Nm (40 in-lb).

Use of 90°C copper wire is recommended

**Table 4 Input cable selection list—50Hz**

| Maximum System Rated Load | Input Voltage - 220VAC      |  | Input Voltage - 230VAC      |  | Input Voltage - 240VAC      |  |
|---------------------------|-----------------------------|--|-----------------------------|--|-----------------------------|--|
|                           | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker |
| 5kVA                      | 25A                         | 50A  | 24A                         | 50A  | 23A                         | 50A  |
| 10kVA                     | 49A                         | 63A  | 47A                         | 63A  | 45A                         | 63A  |
| 15kVA                     | 73A                         | 100A   | 70A                         | 100A   | 67A                         | 100A   |
| 20kVA                     | 97A                         | 125A   | 93A                         | 125A   | 90A                         | 125A   |

The power input and output terminals accept a maximum cable cross-sectional area of 35mm<sup>2</sup> (2AWG); the minimum cable cross-sectional area is 16mm<sup>2</sup> (6AWG); the rated torque is 4.52Nm (40 in-lb).  
90°C copper wire recommended

To connect the cable:

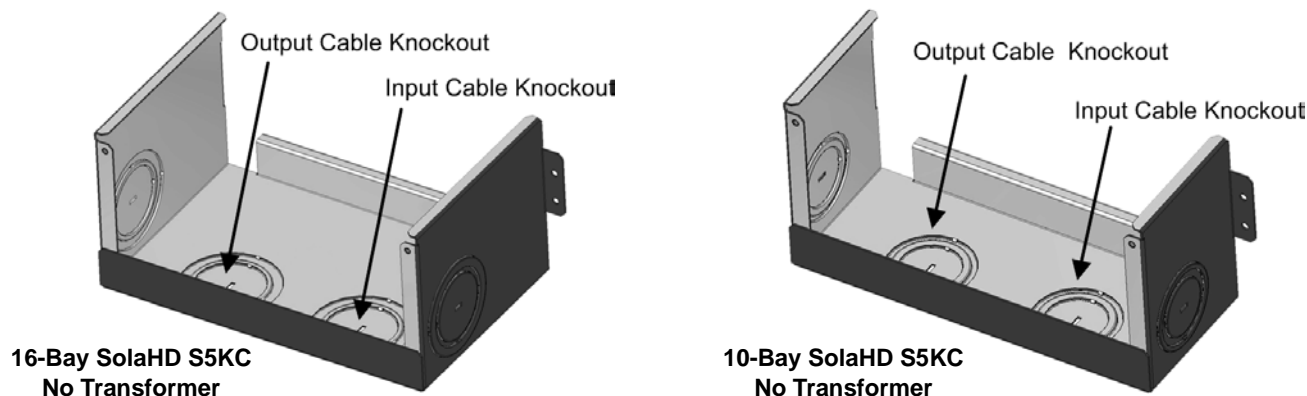


### NOTE

*Input and output cables must be run in separate conduit before cable connection.*

1. Remove the knockouts at the junction box (see **Figure 31**) and pull the cables through them, leaving some slack for installation.

**Figure 31 Knockouts**

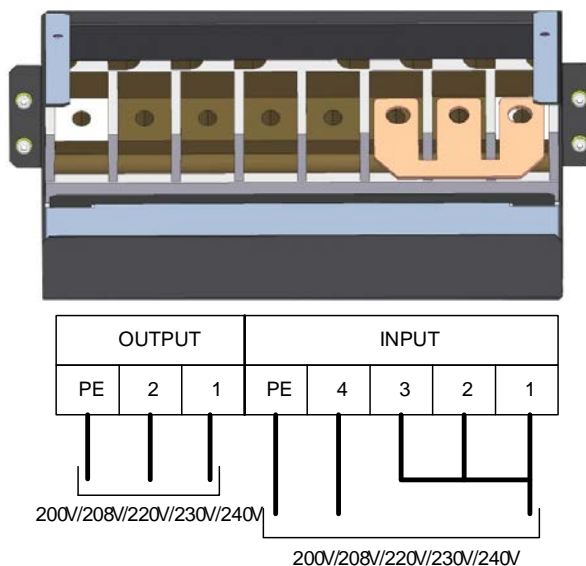




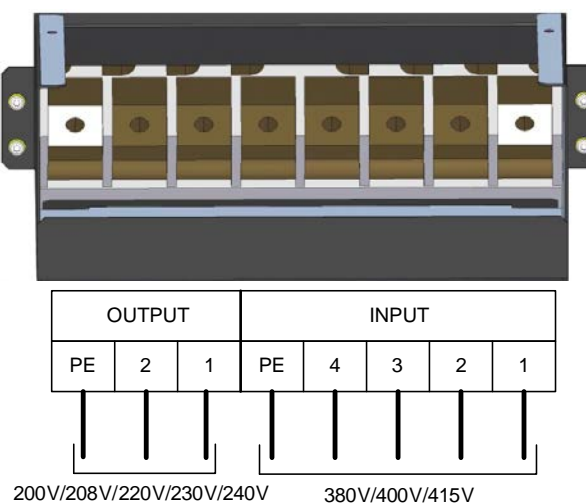
2. Connect the cables to the corresponding terminal of the power input and output terminals.
3. Tighten the screws to 4.52Nm (40 in-lb) with a 13mm (1/2") torque wrench.
4. Respectively, secure the conduit of the input/output cables through the cable bridges on the rear panel of the UPS (see **Figure 31**).

The connection methods in the single-phase input mode and the 3-phase input mode are shown in **Figures 32** and **33**, respectively. Installation of the factory-provided copper bar is essential in the single-phase input mode. The copper busbar is in the accessory bag included with the UPS.

**Figure 32 Connection in single-phase input**



**Figure 33 Connection in 3-phase input**





**Table 5 Key to Figures 32 and 33 UPS wiring**

| System Voltage | System Nominal Frequency | Input Terminal Block |      |      |    |     | Output Terminal Block |    |     |
|----------------|--------------------------|----------------------|------|------|----|-----|-----------------------|----|-----|
|                |                          | 1                    | 2    | 3    | 4  | PE  | 1                     | 2  | PE  |
| 200            | 60                       | L1 *                 | L1 * | L1 * | L2 | GND | L1                    | L2 | GND |
| 208            | 60                       | L1 *                 | L1 * | L1 * | L2 | GND | L1                    | L2 | GND |
| 220            | 60                       | L1 *                 | L1 * | L1 * | L2 | GND | L1                    | L2 | GND |
| 230            | 60                       | L1 *                 | L1 * | L1 * | L2 | GND | L1                    | L2 | GND |
| 240            | 60                       | L1 *                 | L1 * | L1 * | L2 | GND | L1                    | L2 | GND |
| 200            | 50                       | L *                  | L *  | L *  | N  | PE  | L                     | N  | PE  |
| 220            | 50                       | L *                  | L *  | L *  | N  | PE  | L                     | N  | PE  |
| 230            | 50                       | L *                  | L *  | L *  | N  | PE  | L                     | N  | PE  |
| 240            | 50                       | L *                  | L *  | L *  | N  | PE  | L                     | N  | PE  |
| 380            | 50                       | L1                   | L2   | L3   | N  | PE  | L                     | N  | PE  |
| 400            | 50                       | L1                   | L2   | L3   | N  | PE  | L                     | N  | PE  |
| 415            | 50                       | L1                   | L2   | L3   | N  | PE  | L                     | N  | PE  |

\* This connection requires the factory-provided three-position busbar to connect the three terminal block positions

## 2.5.2 Transformer-Based UPS Cable Connection



### NOTE

After the output transformer is installed, if the startup is on bypass, the UPS has a six-cycle inrush current that is up to 20 times the rated output current. This must be taken into account when selecting the input overload protection device at the AC input supply distribution point.

To avoid random tripping on startup, Emerson® recommends that the AC input supply be protected with a circuit breaker capable of withstanding this initial inrush (the MCB is derated according to the D curve or TYPE 4).

This UPS is fitted with EMI filters. Earth leakage current is less than 40mA. Transient and steady state earth leakage currents may occur when starting the UPS. This should be taken into account when selecting transient RCCB or RCCD (leakage current devices of the UPS and load).

The MCB of the AC power supply connected to the UPS input must bear this warning:

**Disconnect the connection with UPS before maintaining this circuit**

The warning is required because the UPS has no autofeeding protection device.

The UPS grounding should be in accordance with local regulations.

A junction box is factory-installed on all models of the SolaHD S5KC to ease cable connection.

Select the appropriate input cables according to **Table 6** and **Table 7** based upon the UPS rating and mains frequency. Emerson recommends sizing the frame's overcurrent protection and wiring to permit easier UPS system upgrades.

**Table 6 Input cable selection for transformer-based frames (60 Hz)**

| Maximum System Rated Load | Input Voltage - 200VAC      |  | Input Voltage - 208VAC      |  | Input Voltage - 240VAC      |  |
|---------------------------|-----------------------------|--|-----------------------------|--|-----------------------------|--|
|                           | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker |
| 5kVA                      | 27A                         | 50A  | 26A                         | 50A  | 23A                         | 50A  |
| 10kVA                     | 53A                         | 63A  | 51A                         | 63A  | 45A                         | 63A  |
| 15kVA                     | 80A                         | 100A   | 77A                         | 100A   | 67A                         | 100A   |
| 20kVA                     | 106A                        | 125A   | 102A                        | 125A   | 90A                         | 125A   |

The power input and output terminals accept a maximum cable cross-sectional area of 70mm<sup>2</sup> (2/0AWG); the minimum cable cross-sectional area is 16mm<sup>2</sup> (6AWG). The rated torque is 12.43Nm (110 in-lb). 90°C copper wire recommended.



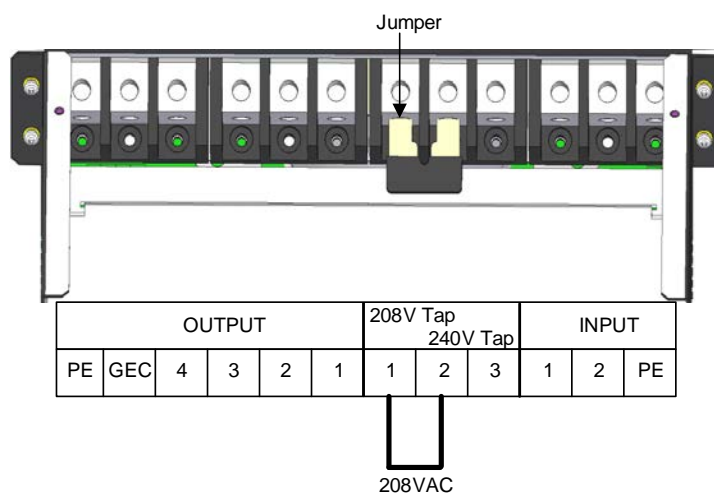
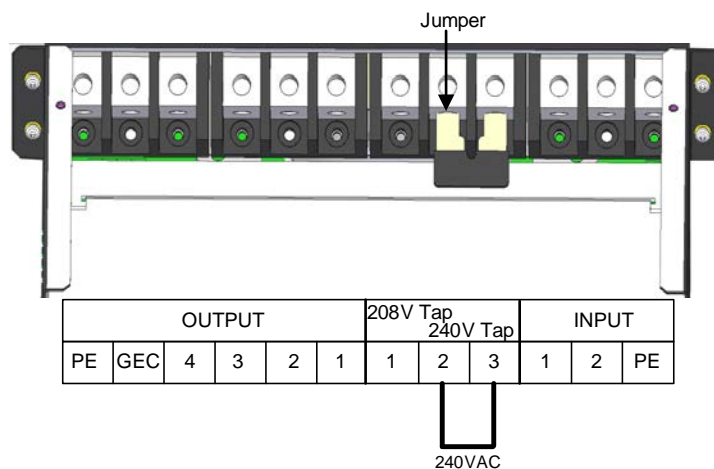
**Table 7** Input cable selection for transformer-based frames (50 Hz)

| Maximum System Rated Load | Input Voltage - 220VAC      |  | Input Voltage - 230VAC      |  | Input Voltage - 240VAC      |  |
|---------------------------|-----------------------------|--|-----------------------------|--|-----------------------------|--|
|                           | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker |
| 5kVA                      | 25A                         | 50A  | 24A                         | 50A  | 23A                         | 50A  |
| 10kVA                     | 49A                         | 63A  | 47A                         | 63A  | 45A                         | 63A  |
| 15kVA                     | 73A                         | 100A   | 70A                         | 100A   | 67A                         | 100A   |
| 20kVA                     | 97A                         | 125A   | 93A                         | 125A   | 90A                         | 125A   |

The power input and output terminals accept a maximum cable cross-sectional area of  $70\text{mm}^2$  (2/0AWG); the minimum cable cross-sectional area is  $16\text{mm}^2$  (6AWG). The rated torque is 12.43Nm (110 in-lb).  
90°C copper wire recommended.

### Configuring the Bypass Voltage

The UPS bypass voltage is factory-set and the copper busbar jumper has been factory-installed. If the jumper setting does not match the input source, the bypass voltage jumper may need to be changed to ensure the correct output voltages are provided when operating in bypass mode. Refer to **Table 9** for the proper setting location according to the AC mains voltage available and to **Figures 34** and **35** for the jumper setting location.

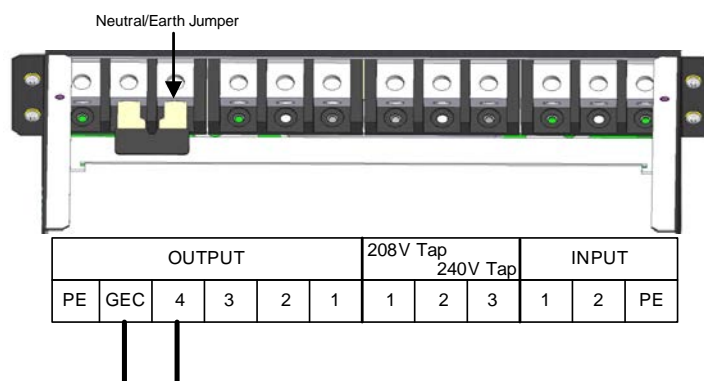
**Figure 34** Setting bypass voltage jumper (default: 208VAC)**Figure 35** Setting bypass voltage jumper (200/220/230/240VAC)



## Configuring the Neutral/Earth Jumper

The UPS contains an isolation transformer that generates a neutral conductor for the connected load. The UPS is a separately derived source and contains a neutral/earth jumper. A factory-installed neutral/earth jumper copper bar may require removal to comply with local codes and regulations.

**Figure 36 Configuring the neutral/earth jumper**



## Connecting Cables

To connect the cable:

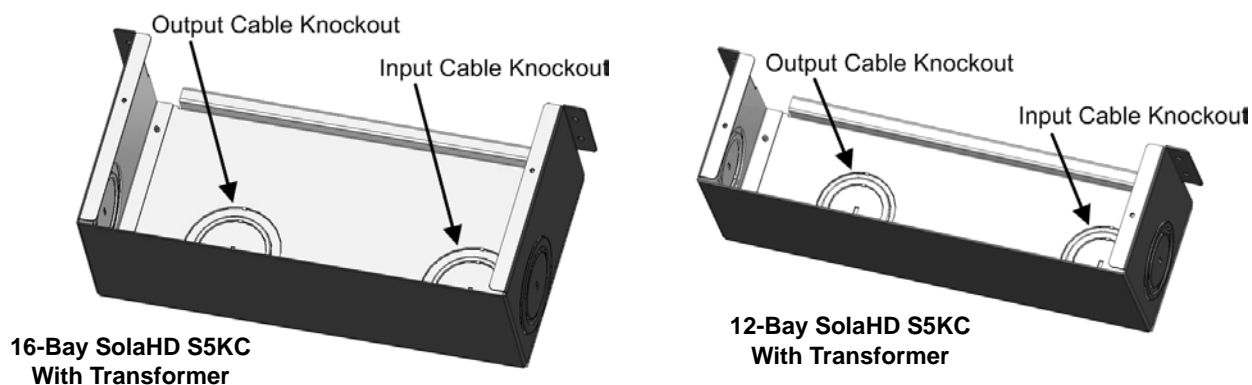


### NOTE

*Input and output cables must be run in separate conduit before cable connection.*

1. Remove the knockouts at the junction box (see **Figure 37**) and pull the cables through them, leaving some slack for installation.

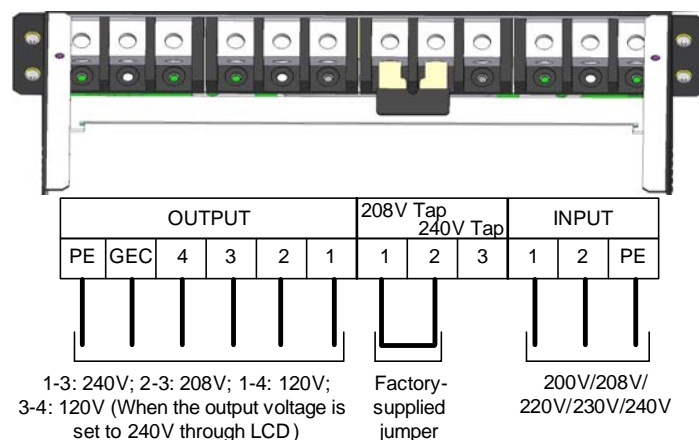
**Figure 37 Knockouts**



2. Connect the cable to the corresponding terminal of the power input and output terminals. Using a torque wrench, tighten the screws to 12.43Nm (110 in-lb). The connections are shown in **Figure 38**.



Figure 38 Connection method



Refer to **Table 7** for configuring the output cable. For standard voltages, make the connections shown in **Table 9**.

Table 8 Key to Figure 38 UPS input wiring

| System Voltage | System Nominal Frequency | Input Terminal Block |    |     |
|----------------|--------------------------|----------------------|----|-----|
|                |                          | 1                    | 2  | PE  |
| 200            | 60                       | L1                   | L2 | GND |
| 208            | 60                       | L1                   | L2 | GND |
| 220            | 60                       | L1                   | L2 | GND |
| 230            | 60                       | L1                   | L2 | GND |
| 240            | 60                       | L1                   | L2 | GND |
| 200            | 50                       | L                    | N  | PE  |
| 220            | 50                       | L                    | N  | PE  |
| 230            | 50                       | L                    | N  | PE  |
| 240            | 50                       | L                    | N  | PE  |

Table 9 Key to Figure 38 UPS output wiring

| Output Voltage | Set Output Voltage by LCD | Bypass Voltage Jumper |                | Output Voltage (Between Terminals) |     |                     |                     |
|----------------|---------------------------|-----------------------|----------------|------------------------------------|-----|---------------------|---------------------|
|                |                           | 208V TAP (1-2)        | 240V TAP (2-3) | 1-4                                | 3-4 | 2-3                 | 1-3                 |
| 200/100        | 200                       | —                     | OK             | 100                                | 100 | 173<br>(Do Not Use) | 200                 |
| 220/110        | 220                       | —                     | OK             | 110                                | 110 | 190<br>(Do Not Use) | 220                 |
| 230/115        | 230                       | —                     | OK             | 115                                | 115 | 199<br>(Do Not Use) | 230                 |
| 220/127        | 220                       | OK                    | —              | 127                                | 127 | 220                 | 254<br>(Do Not Use) |
| 240/120        | 240                       | —                     | OK             | 120                                | 120 | 208                 | 240                 |
| 208/120        | 208                       | OK                    | —              | 120                                | 120 | 208                 | 240                 |

If the bypass voltage jumper copper bar is connected incorrectly, the system will report a fault alarm.

When wiring to single-phase panels, connect to output terminals 1, 3, 4 and PE (GND) only.

**Table 10** shows the maximum load capacity of the output winding of the transformer-based UPS.

Table 10 Maximum load capacity of the output winding

| UPS Model                    | Maximum Output Capacity, kVA<br>(Between Terminals) |     |     |     |
|------------------------------|---|-----|-----|-----|
|                              | 1-4   | 3-4 | 2-3 | 1-3 |
| 16-bay Transformer-based UPS | 10  | 10  | 20  | 20  |
| 10-bay Transformer-based UPS | 7.5   | 7.5 | 15  | 15  |



### 2.5.3 Transformer-Free UPS—Dual Inverter Frames

A junction box is factory-installed on all models of the SolaHD S5KC to ease cable connection.

Select the appropriate input cables according to **Tables 11** and **12** based on the UPS rating and mains frequency. Emerson recommends sizing the overcurrent protection and wiring for the frame rating for easing upgrades to the UPS system.

**Table 11 Input cable selection for transformer-free dual inverter frames (50/60 Hz)**

| Maximum System Rated Load | Input Voltage – 200/100VAC  |  | Input Voltage – 208/120VAC  |  | Input Voltage – 240/120VAC  |  |
|---------------------------|-----------------------------|--|-----------------------------|--|-----------------------------|--|
|                           | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker |
| 5kVA                      | 28A                         | 50A  | 27A                         | 50A  | 27A                         | 50A  |
| 10kVA                     | 56A                         | 63A  | 54A                         | 63A  | 54A                         | 63A  |
| 15kVA                     | 84A                         | 100A   | 80A                         | 100A   | 80A                         | 100A   |
| 20kVA                     | 112A                        | 125A   | 107A                        | 125A   | 107A                        | 125A   |

The power input and output terminals accept a maximum cable cross-sectional area of 35mm<sup>2</sup> (2AWG); the minimum cable cross-sectional area is 16mm<sup>2</sup> (6AWG); and the rated torque is 4.52Nm (40 in-lb).  
90°C copper wire is recommended.

**Table 12 Input cable selection for transformer-free dual inverter frames (50/60 Hz)**

| Maximum System Rated Load | Input voltage – 220/110VAC  |  | Input voltage – 230/115VAC  |  | Input voltage – 220/127VAC  |  |
|---------------------------|-----------------------------|--|-----------------------------|--|-----------------------------|--|
|                           | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker | Maximum Current in UPS Mode | Recommended Input Protection Circuit Breaker |
| 5kVA                      | 28A                         | 50A  | 28A                         | 50A  | 27A                         | 50A  |
| 10kVA                     | 56A                         | 63A  | 56A                         | 63A  | 54A                         | 63A  |
| 15kVA                     | 84A                         | 100A   | 84A                         | 100A   | 80A                         | 100A   |
| 20kVA                     | 112A                        | 125A   | 112A                        | 125A   | 107A                        | 125A   |

The power input and output terminals accept a maximum cable cross-sectional area of 35mm<sup>2</sup> (2AWG); the minimum cable cross-sectional area is 16mm<sup>2</sup> (6AWG); and the rated torque is 4.52Nm (40 in-lb);  
90°C copper wire is recommended.

To connect the cable:

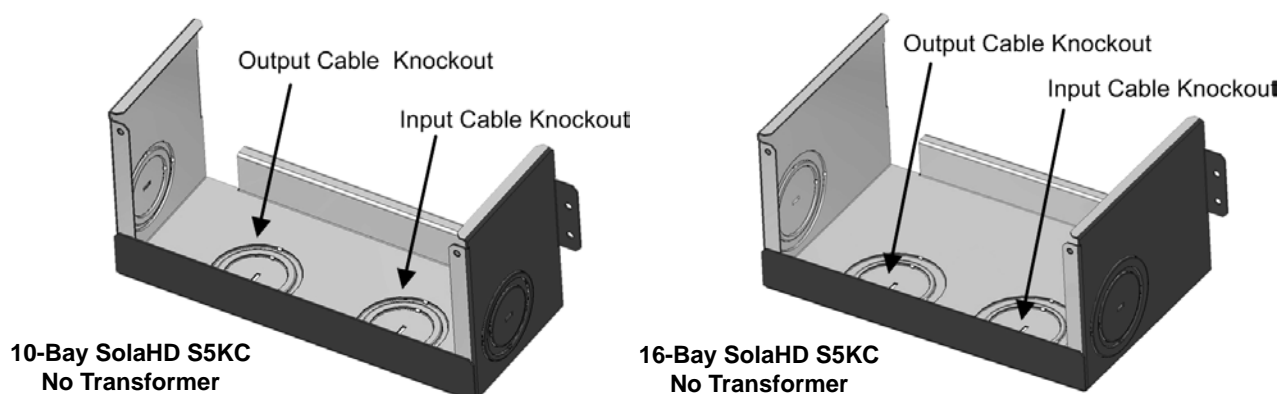


#### NOTE

*Input and output cables must be run in separate conduit before cable connection.*

1. Remove the knockouts at the junction box (see **Figure 31**) and pull the cables through them, leaving some slack for installation.

**Figure 39 Knockouts**



2. Connect the cables to the corresponding terminal of the power input and output terminals.
3. Tighten the screws to 4.52Nm (40 in-lb) with a 13mm (1/2 in) torque wrench.



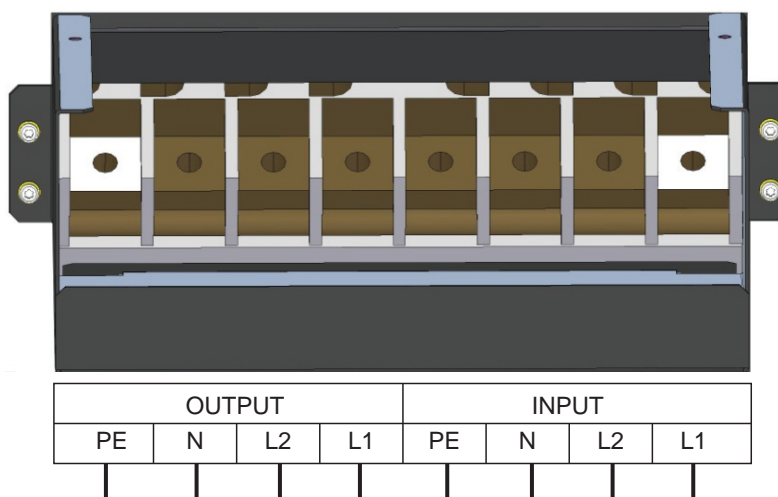
4. Respectively secure the input/output cables through the cable bridges on the rear panel of the UPS (see **Figure 40**).

**Figure 40** Secure cables on cable bridges



The connections for the single-phase input mode and the 3-phase input mode are shown in **Figure 32** and **Figure 33**, respectively. The copper jumper busbar is essential for the single-phase input mode.

**Figure 41** Wiring connections





## 2.5.4 Connecting External Battery Cabinet

Up to four external battery cabinets may be connected to the SolaHD S5KC Series UPS to provide longer battery run times.

The external battery cabinet (EBC) requires the use of one of the optional EBC cable kits for connection to the UPS. The optional cable kits each contain the power and communication cables required for proper operation and monitoring of the battery modules. The standard cable kit lengths are 1, 3, and 5 meters (3.2, 9.8 and 16.4 ft.) to accommodate different site installation requirements.

To connect an external battery cabinet:

1. Verify that the EBC DC circuit breaker is open. The circuit breaker is on the front bottom of the EBC frame behind the bottom two bezels.
2. Connect one end of the battery cable to the external battery connector on the rear of the UPS frame.
3. Connect the other end to the closest corresponding port on the rear of the EBC frame, as shown in **Figures 42** and **43**.
4. Install and tighten the grounding screw on the battery cable assembly, on both the UPS and EBC ends. This screw also secures the cable assembly to the frames to prevent accidental disconnection.
5. For new systems that included an EBC, the EBC communication card should already be installed in the UPS frame (IntelliSlot Port #3, typically). If it is not already in the UPS frame, obtain the EBC communication card and insert it into any open IntelliSlot port (preferably Port #3). Connect the provided EBC communication cable to the UPS and EBC as shown in **Figures 42** and **43**.
6. Check the EBC DIP switch settings on the top rear of each EBC frame. Verify they are set correctly according to **Table 13**.
7. Close the EBC DC circuit breaker and replace the bezels back onto the EBC.

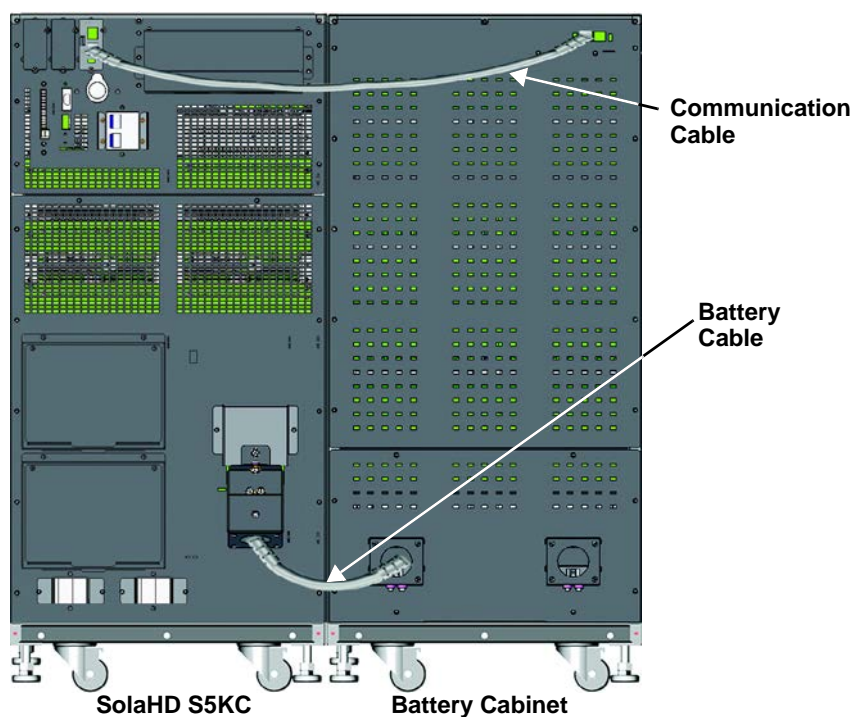
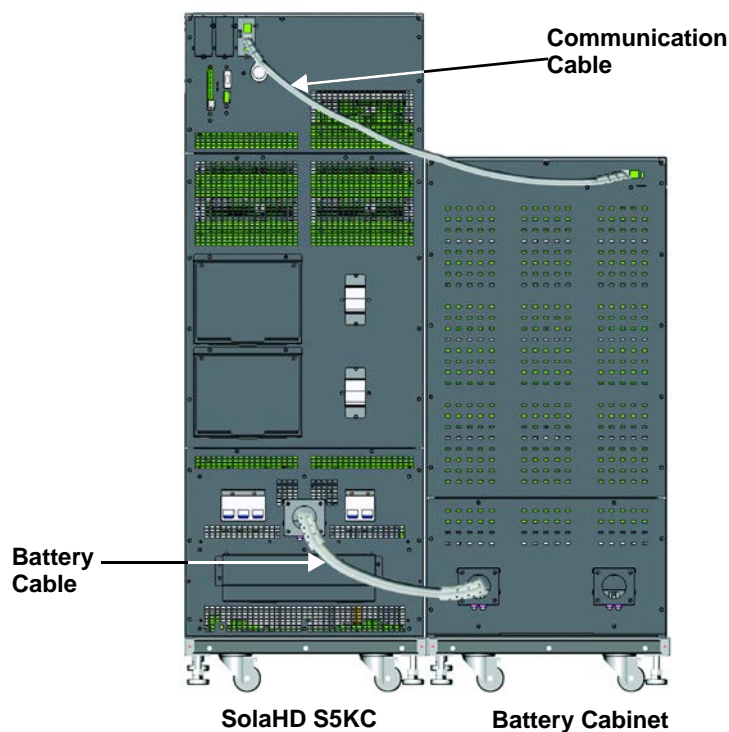


### WARNING

Risk of hazardous voltage between UPS frames. Can cause damage to equipment, injury and death.

Failure to open the EBC DC circuit breaker before connecting or disconnecting the battery cable between the UPS and EBC frames can result in hazardous voltages being present between the frames.

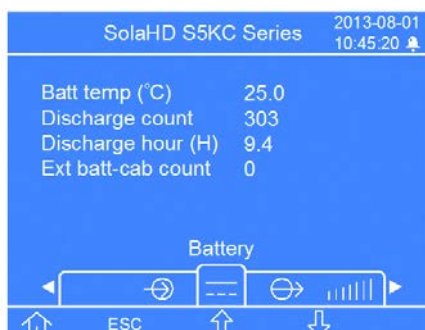


**Figure 42 Connecting external battery cabinet to a transformer-free UPS****Figure 43 Connecting external battery cabinet (transformer-based UPS)**

After connecting the external battery cabinet, use the user interface to determine the number of external battery cabinets, as shown in **Figure 44**.



Figure 44 Battery screen



If the number displayed is not consistent with the actual installation number of external battery cabinets:

- Ensure each external battery cabinet contains two battery modules installed on the same row and both have the locking levers in the locked position.
- Ensure the IntelliSlot® EBC card is installed properly and the communication cables are fully inserted in the connectors.
- Determine that the DIP switch setting of each battery cabinet is correct using the following table

Table 13 EBC DIP switch settings

| External Battery Cabinet Number | DIP Switch Setting |      |
|---------------------------------|--------------------|------|
|                                 | 1                  | 2    |
| EBC #1                          | UP                 | UP   |
| EBC #2                          | Down               | UP   |
| EBC #3                          | UP                 | Down |
| EBC #4                          | Down               | Down |

### 2.5.5 Connecting Integrated Power Output Distribution (POD)

The rear panel of the SolaHD S5KC UPS provides the capability to add integrated distribution outlets (PODs) as an option to allow direct AC power connection of the supported equipment to the UPS. These PODs are intended to allow the user to install and even change distribution, if necessary as



equipment changes, while the UPS is still providing power. Follow these steps to properly and safely add or change the optional PODs.

1. Ensure that the POD breaker is in the Off position.



#### NOTE

*This is the breaker located near the POD port.*

2. Using a Phillips screwdriver, remove the two screws that are at the top of the POD cover plate and retain these for reattaching the POD.
3. Remove the POD cover plate to expose the POD connectors.
4. Insert the bottom of the POD into the slot provided, and then connect the POD connectors.



#### NOTE

*The connector should connect only one way, matching the color of the pins.*



#### NOTE

*Distribution PODs PD2-101, PD2-102, PD2-103, PD2-104, PD2-105, PD2-106 and PD2-107 should not be used if the UPS output voltage is set to 220/127V.*



#### NOTE

*When connecting distribution POD's to an S5KCC or S5KCD frame, the L-L output receptacles will connect to the 240V taps of the output transformer, not to the 208V tap. Verify receptacle voltage and load ratings before energizing the load.*

5. Secure the POD by using the two screws removed in **Step 2**.
6. Repeat **Steps 1** through **5** to install a second POD on the SolaHD S5KC (only the 16-bay frame has two POD ports).
7. Connect the equipment to the appropriate outlets.
8. Close the POD breaker(s) to connect AC power to the outlets.
9. After commissioning the UPS, turn On the connected equipment per the manufacturer's instructions (see **2.5.6 - Commissioning/Startup Procedures**).

## 2.5.6 Commissioning/Startup Procedures

The SolaHD S5KC can be commissioned with or without AC power being connected. Follow these steps for the initial UPS system startup:

### Checks Before Commissioning/Startup

- \_\_\_ 1. Verify that the AC power connections are wired properly and all connections are tight.
- \_\_\_ 2. If using external battery cabinets or third-party battery systems, verify that the DC power and communication cables are connected properly and all connections are tight.
- \_\_\_ 3. Measure and record the AC input voltage and frequency. This will be needed to properly configure the output voltage of the SolaHD S5KC system.
- \_\_\_ 4. If any modules within the SolaHD S5KC system were removed during installation, verify that all modules are fully inserted and that the module locking levers are in the locked position.
- \_\_\_ 5. If the UPS is being connected into a Remote Emergency Power Off (REPO) circuit, refer to **3.3 - REPO (Remote Emergency Power Off)** for the REPO connection details and instructions. If no REPO circuit is required or used, the factory-installed jumper must be removed from the terminal block Pins 9-10 as described in **3.2 - Dry Contact Ports**.
- \_\_\_ 6. Verify that the UPS internal bypass breaker is in the open position with the guard in place and secure.



**Commissioning/Startup with AC Power Available (Normal Mode Operation)**

- \_\_\_ 1. Verify that the upstream mains AC breaker is closed.
- \_\_\_ 2. Turn On the UPS Enable switch on the rear of the unit (it is protected by a clear plastic cover).
- \_\_\_ 3. Close the UPS input breaker: it is on the front of transformer-free frame systems and on the rear of transformer-based frame systems.

**NOTE**

*This will begin the initial system checks and enable power to begin charging the battery*

- \_\_\_ 4. Press the ON/OFF button on the LCD panel.
- \_\_\_ 5. When asked to confirm, press Enter (F5 button) to turn On the UPS.
- \_\_\_ 6. Close the UPS output breaker on the rear of the unit.
- \_\_\_ 7. If supplying power to an external distribution panel, close all breakers to provide power to the equipment. If using the integral distribution PODs on the UPS or MBC, ensure the individual POD breakers are closed.

**Commissioning/Startup Without AC Power Available (Battery Mode Operation)****NOTE**

*Starting the UPS system without AC power will discharge the batteries. If AC mains power is not restored before the batteries discharge, the UPS will shutdown and power will be lost to the connected equipment. If the UPS reaches the battery EOD level and shuts down, AC mains power must be present to restart the UPS system.*

- 1. Check to ensure the upstream mains AC breaker is closed.
- 2. Turn on the UPS “Enable” switch on the rear of the unit.
- 3. Locate the “Battery Start” push button that is on either of the two control modules. Press and hold this button for 5 seconds.

**NOTE**

*This will begin the initial system checks and automatically enable output power.*

- 4. Press the On/Off button on the LCD panel.
- 5. When asked to confirm, press Enter (F5 button) to turn On the UPS.
- 6. Close the output breaker on the rear of the SolaHD S5KC.
- 7. If supplying power to an external distribution panel, close all breakers to provide power to the equipment. If using the integral distribution PODs on the UPS or MBC, verify that the individual POD breakers are closed.
- 8. Emerson recommends closing the UPS input breaker; it is on the front of transformer-free frame systems and on the rear of transformer-based frame systems. If AC mains becomes available, the UPS will revert to AC power mode and begin recharging the battery.



## 3.0 COMMUNICATION

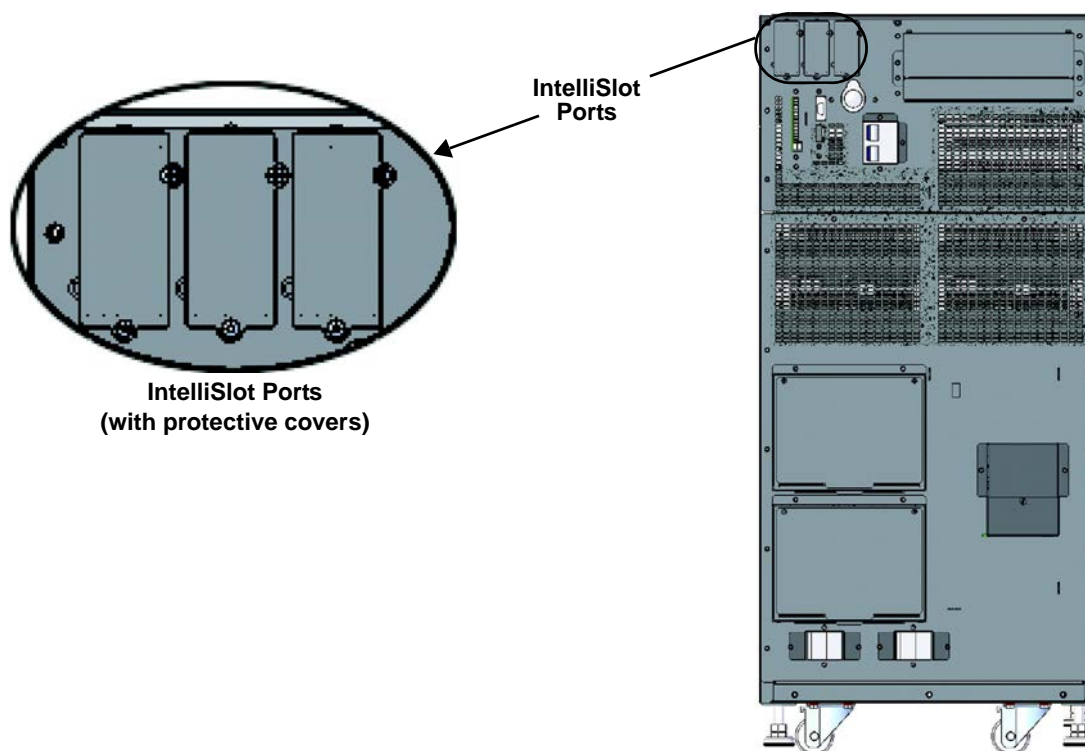
The rear panel of the SolaHD S5KC provides these communication ports:

- IntelliSlot® ports: 3
- Dry contact ports: 1
- REPO (Remote Emergency Power Off): 1
- Long Run Time (LRT) Battery Temperature Probe Terminals: 1
- USB port: 1

### 3.1 IntelliSlot Ports

The three IntelliSlot communication ports (see **Figure 45**) are used for installing communication options, including the IntelliSlot Unity card, dry contact card, MultiPort and IntelliSlot EBC card. The IntelliSlot ports and the USB port can be used at the same time.

**Figure 45 IntelliSlot communication port location**



#### IntelliSlot Unity Cards—IS-UNITY-LIFE, IS-UNITY-DP

- **IS-UNITY-LIFE:** This card is standard in every SolaHD S5KC. It is used for communication between the SolaHD S5KC UPS and Emerson's Trellis® NMS and LIFE Services.
- **IS-UNITY-DP:** This optional card can be used instead of the standard card if communication to two third-party platforms is required. Third-party platforms include SNMP and 485 (Modbus/Bacnet) protocols. This card would still be used for communication between the SolaHD S5KC UPS and Emerson's Trellis NMS and LIFE Services. All communication protocols are active simultaneously.

#### IntelliSlot® Dry Contact Card (IS-RELAY)

Provides dry contact alarm information, including: On Battery, On Bypass, Low Battery, Summary Alarm, UPS Fault and On UPS signals for communication to a remote monitoring system or for use with MultiLink® software. This card also can accept input signals to shut down the UPS while it is in any mode of operation.



### IntelliSlot MultiPort Card (IS-MULTIPORT)

Provides dry contact alarm information, including: On Battery, Low Battery signals for communication to four servers for use with MultiLink software.

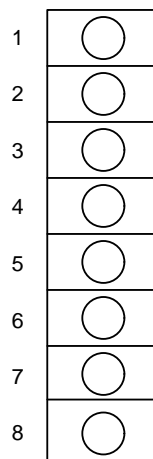
### IntelliSlot EBC Card

This card is used for the SolaHD S5KC UPS to monitor and manage the intelligent battery modules in external matching battery cabinets.

## 3.2 Dry Contact Ports

The UPS provides dry contact ports. See **Figure 1** for location and **Figure 46** for the pin layout.

**Figure 46** Pin layout of the dry contacts



**Table 14** shows the pin definition of each dry contact port.

**Table 14** Pin definition of dry contact port

| Position | Name                   | Description                                  |
|----------|------------------------|--|
| 1        | Battery Mode           | Output dry contact of battery mode operation |
| 2        | Battery Mode           | Output dry contact of battery mode operation |
| 3        | Low Battery            | Output dry contact of low battery operation  |
| 4        | Low Battery            | Output dry contact of low battery operation  |
| 5        | Any Mode Shut Down     | Input dry contact of any mode shut down      |
| 6        | GND                    | Any mode shutdown GND                        |
| 7        | Battery Mode Shut Down | Input dry contact of battery mode shut down  |
| 8        | GND                    | Battery mode shutdown GND                    |

### Battery Mode Dry Contact

**Pins 1 and 2:** Output dry contact, normally open. The dry contact is closed when the UPS is operating on battery. The maximum voltage and current are 24VDC and 0.3A, respectively.

### Low Battery Dry Contact

**Pins 3 and 4:** Output dry contact, normally open. When the UPS is operating on battery, the dry contact is closed upon battery low voltage alarm. The maximum voltage and current are 24VDC and 0.3A, respectively.

### Any Mode Shut Down

**Pins 5 and 6:** Input dry contact, normally open. After the external dry contact is closed (shorted), the UPS output will be shut down during any mode of operation (mains, battery, bypass).



## Battery Mode Shut Down

**Pins 7 and 8:** Input dry contact, normally open. After the external dry contact is closed (shorted), the UPS output will be shut down only during battery mode operation.



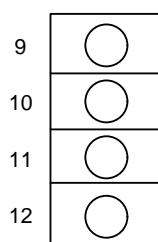
### NOTE

*The default for the Any Mode and Battery Mode Shutdown features is disabled. Using this function requires setting Remote Comms shutdown to Enabled in the Settings through the LCD. Additionally, the shutdown delay can be accessed in the LCD Settings to set the delay time for the UPS shutdown after the dry contact is closed. Enabling the feature on the LCD enables both shutdown methods.*

## 3.3 REPO (Remote Emergency Power Off)

The SolaHD S5KC is equipped with a REPO (Remote Emergency Power Off) connection. Only the SELV (Safety Extra Low Voltage) circuit can be connected to the REPO terminal block. **Figure 48** shows the REPO connection pin layout. See **Table 15** for the pin definition.

**Figure 47** REPO connector pin layout

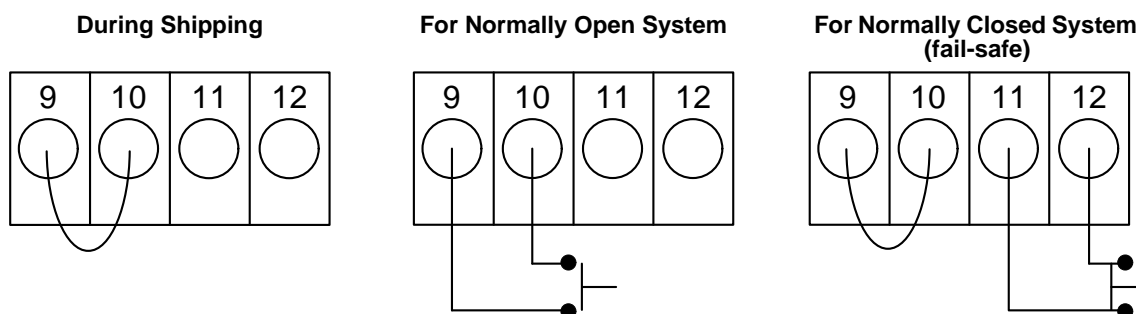


**Table 15** Pin definition of the REPO dry contact

| Position | Name          | Description  |
|----------|---------------|--|
| 9        | REPO +12V     | REPO power, 12VDC 100mA  |
| 10       | REPO Coil -NO | REPO normally open nodes, shorting pins 9 and 10, REPO is triggered  |
| 11       | REPO Coil -NC | REPO normally closed nodes (fail-safe), shorting pins 9, 10, 11, 12, and opening pins 11 and 12, REPO is triggered |
| 12       | GND           | GND  |

**Figure 47** shows the schematic diagram of REPO switch connections.

**Figure 48** REPO switch connections



## WARNING

Risk of electrical shock. Can cause property damage, injury and death.

Operating the REPO circuit will NOT trip the manual bypass breaker. If the REPO must shut off UPS output under all circumstances, the user must tie the REPO into the breaker feeding the UPS source. Otherwise, voltage may be present on the output connections if the unit is in manual bypass.



## NOTICE

Risk of improper installation. Can cause unintended UPS shutdown and loss of power to the load.

Run signal cables separately from power cables. Running cables in the same conduit can cause signal noise, possibly causing the system to shut down.



### NOTE

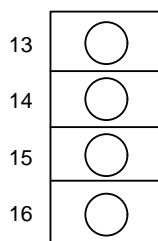
*A jumper is factory-installed between Pins 9 and 10 to disable the Main Control Switch. This will prevent the UPS from being started accidentally during shipment and installation. This jumper must be removed before the unit can be started.*

*If the installation does not require connection to a REPO system, the factory-installed jumper must be removed.*

## 3.4 Long Run Time (LRT) Battery Temperature Probe Terminals

The SolaHD S5KC contains a temperature-compensated battery charging system. To use this feature with external LRT battery systems, Pins 13-16 of the contact terminal strip are used to connect a temperature sensor. See **Figure 49** and **Table 16** for the pin definition of the temperature sensor terminals.

**Figure 49** Pin layout of the temperature sensor terminal



**Table 16** Pin definition of the temperature sensor terminal

| Position | Name                        | Description   |
|----------|-----------------------------|---|
| 13       | Inside Battery Temperature  | Locate battery temperature signal close to the UPS  |
| 14       | Battery Temperature +12V    | Battery temperature signal power supply             |
| 15       | Outside Battery Temperature | Locate battery temperature signal at UPS remote end |
| 16       | GND                         | GND   |

## 3.5 USB Port

The SolaHD S5KC UPS contains a standard B type USB port on the rear of the unit to connect the UPS to a network server or other computer for monitoring using any operating system, built-in UPS support or in conjunction with MultiLink® software.



### 3.6 MultiLink®

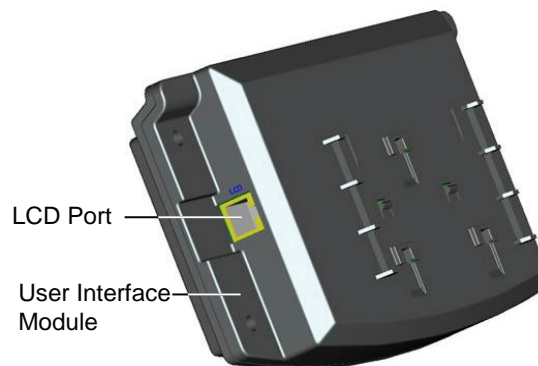
MultiLink monitors the UPS continuously and can shut down configured computers in the event of an extended power failure. MultiLink can also be configured to shut down the UPS. MultiLink can also be configured for use without the USB cable when the IntelliSlot® UNITY-DP SNMP Card is installed in the UPS. An optional MultiLink License Kit permits shutting down the UPS over a network. For more information about the IntelliSlot SNMP Card, IntelliSlot Web Card and MultiLink license kits, visit <http://www.solahd.com> or contact your local Emerson representative.

### 3.7 LCD Port

The LCD module contains the LCD port, which is used for power and data communication between the UPS monitor module and display module. The LCD module can be removed from the SolaHD S5KC and remotely located. A longer Ethernet cable must be used when installing the LCD module remotely. A standard Ethernet (Category 5, with RJ-45 connectors, both ends meet T568B standard) type cable can be used. Maximum cable length is 14 meters to ensure proper communication signals between the UPS and the LCD module.

The user interface module provides three network ports and one USB port. Of those, one network port (LCD port) is used for power supply and communication of the user interface module. Other network ports and the USB port are reserved for use only by customer service personnel.

**Figure 50 LCD port**



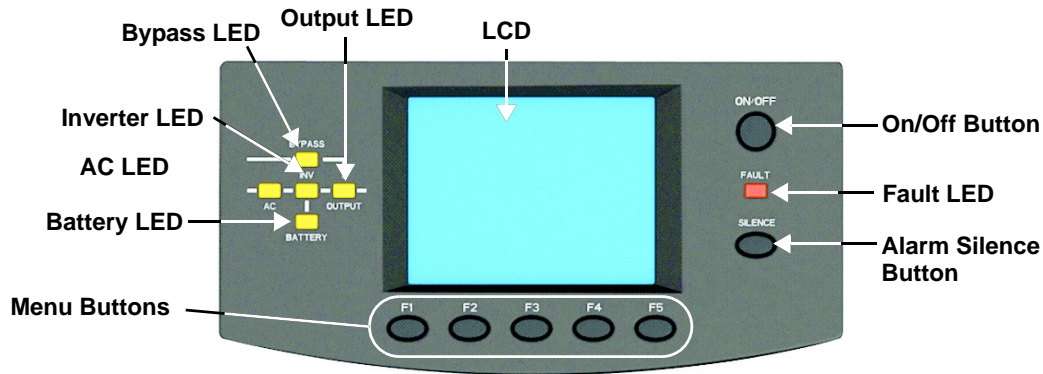


## 4.0 OPERATION AND DISPLAY PANEL

### 4.1 Overview

This chapter describes the functions and operation of the UPS display panel. The LCD is composed of an LED mimic power flow diagram, fault LED indicator and LCD screen to show detailed operational information and UPS alarm list using the menu buttons. For location and information about the display panel, refer to **Figure 51** below

**Figure 51 Operation and display panel**



### Mimic LEDs

The mimic power flow LEDs indicate current operating state of the UPS. The state descriptions of the LEDs are given in **Table 17**.

**Table 17 LED descriptions**

| LED          | State            | Description   |
|--------------|------------------|---|
| AC LED       | On (Green)       | The rectifier is functioning normally   |
|              | Flashing (Green) | The AC mains is normal, but the rectifier is not functioning properly                         |
|              | On (Red)         | The rectifier is faulty   |
|              | Off              | The AC mains is abnormal, and the rectifier is not functioning                                |
| Battery LED  | On (Green)       | The battery is discharging  |
|              | Flashing (Green) | The battery has a pre-alarm of low voltage  |
|              | On (Red)         | The DC-DC converter is faulty   |
|              | Off              | The battery is charging, and the DC-DC converter is not functioning                           |
| Bypass LED   | On (Green)       | The bypass is supplying power   |
|              | On (Red)         | The bypass is abnormal and not available  |
|              | Off              | The bypass is normal, but not supplying output power  |
| Inverter LED | On (green)       | The inverter is supplying output power  |
|              | Flashing (green) | The inverter is starting up, in soft start or phase locked, and is not supplying output power |
|              | On (red)         | The inverter is faulty  |
|              | Off              | The inverter is off   |
| Output LED   | On (green)       | The UPS output is supplying power   |
|              | Flashing (green) | The UPS internal manual bypass is supplying output power                                      |
|              | On (red)         | The UPS has output overload   |
|              | Off              | The UPS does not have output power  |
| Fault LED    | On (yellow)      | The UPS has an alarm or alarms  |
|              | On (red)         | The UPS has one or more faults  |
|              | Off              | UPS operating normally with no alarm or fault conditions                                      |



## Audible Alarms

Three different audible alarms may occur during the UPS operation; see **Table 18** for a description of the audible alarms.

**Table 18 Audible alarm descriptions**

| Alarm sound               | Meaning  |
|---------------------------|--|
| One beep per second       | When the UPS has an alarm, for example, AC fault (mains failure)       |
| One beep every 0.5 second | Upon UPS output overload or low battery voltage alarm during discharge |
| Continuous beep           | When the UPS has a fault   |

## Control Buttons

The operation and display panel provides two control buttons. See **Table 19** for their function descriptions.







**Table 19 Control buttons functions**

| Control Button       | Function  |
|----------------------|---|
| ON/OFF Button        | Used to turn the UPS On and Off.  |
| Alarm Silence Button | When an audible alarm sounds, pressing this button can silence the alarm. Pressing this button again can restart the audible alarm. |

## LCD and Menu Buttons

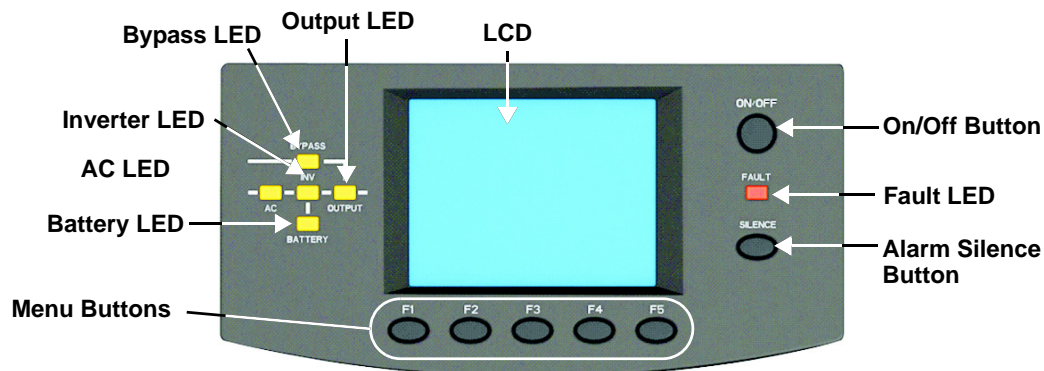
The operation and display panel provides an LCD screen and five menu buttons (F1, F2, F3, F4, F5). See **Table 20** for the function description of each menu button.

**Table 20 Function descriptions of menu button**

| Button     | F1  | F2       | F3  | F4  | F5   |
|------------|---|----------|---|---|--|
| Function 1 | <br>HOME | —        | <br>To Left | <br>To Right | <br>Enter |
| Function 2 | —   | ESC Exit | <br>Up       | <br>Down     | —  |

The LCD is a 320 × 240 dot matrix graphic display. Through the LCD interface and the easily operated menu, you can browse the UPS input, output, load and battery parameters and obtain the current state and alarm information of the UPS. You also can perform relevant function/parameter settings and control operations.

**Figure 52 User interface module layout**





## 4.2 LCD Screen

### 4.2.1 Startup Screen

When the UPS starts up, it will conduct a self-test, and the LCD will display the startup screen, which lasts for 15 seconds as shown in **Figure 53**.

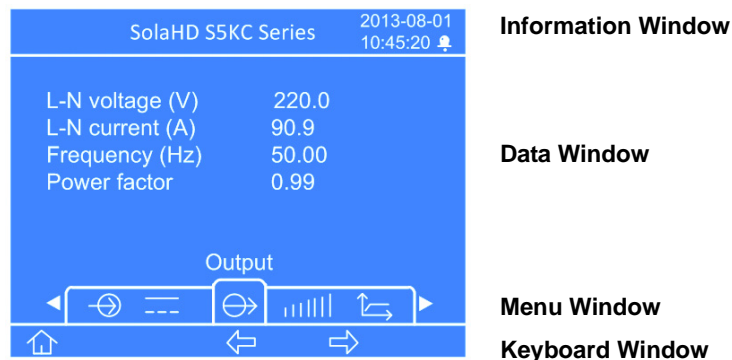
**Figure 53** Startup screen



### 4.2.2 Main Screen

The main screen is divided into four parts: system information window, data window, menu window and keyboard window, as shown in **Figure 54**.

**Figure 54** Main screen



The functions of F1 ~ F5 buttons will change automatically according to the currently-displayed screen. On any screen, pressing the F1 button will return to the Output screen.

### System Information Window

The system information window displays the current time and the UPS name without requiring user intervention. See **Table 21** for the detailed description.

**Table 21** Item description of system information window

| Item                     | Description   |
|--------------------------|---|
| SolaHD S5KC              | UPS name, representing SolaHD S5KC                                    |
| 2012-01-01<br>10: 45: 20 | Current time (format: year-month-date)<br>(format: 24 hours, h: m: s) |



## Menu Window and Data Window

The menu window shows the menu name and allows navigation to different menu items. Each menu item has a set of data that is displayed in the data window. Using the menu window, you can browse the relevant parameters of the UPS and can adjust/set some operational parameters. See **Table 22** for the menu and data descriptions.

**Table 22** Item description of menu window and data window

| Menu Name       | Data Item             | Data Description  |
|-----------------|-----------------------|---|
| Mains           | L-N Voltage (V)       | L-N input voltage   |
|                 | L-N Current (A)       | L-N input current   |
|                 | Frequency (Hz)        | Input frequency   |
|                 | L-L Voltage (V)       | L-L input voltage   |
|                 | kVA                   | Input apparent power  |
|                 | Power Factor          | Input power factor  |
| Battery         | Batt Voltage (V)      | Battery bus voltage   |
|                 | Batt Current (A)      | Battery bus current   |
|                 | Runtime (Min.)        | Battery backup time remaining   |
|                 | Batt Capacity (%)     | Percentage of battery capacity  |
|                 | Batt State            | Charging, discharging or fully charged  |
|                 | Batt String Count     | Online battery string count   |
|                 | Batt Temp (°C)        | Battery temperature   |
|                 | Discharge Count       | Maximum historical discharge count within current battery modules                 |
|                 | Discharge Time (H)    | Maximum historical discharge time within current battery modules                  |
|                 | EBC Count             | Number of connected External Battery Cabinets                                     |
| Output          | L-N Voltage (V)       | L-N Output Voltage  |
|                 | L-N Current (A)       | L-N Output Current  |
|                 | Frequency (Hz)        | Output Frequency  |
|                 | Power Factor          | Output Power Factor   |
|                 | Line Voltage (V)      | L-L Output Voltage (not displayed for single-phase output model)                  |
| Load            | kVA                   | Output apparent power   |
|                 | kW                    | Output active power   |
|                 | Load Level (%)        | Output loading, indicated in percentage of the UPS system rated load              |
|                 | Crest Factor          | Output current peak value factor  |
| UPS Info        | UPS ID                | UPS ID  |
|                 | LCD Module            | If the module is online, the serial number and software version will be displayed |
|                 | Bypass Monitor Module | If the module is online, the serial number and software version will be displayed |
|                 | Bypass Control Module | If the module is online, the serial number and software version will be displayed |
|                 | Charger Module        | If the module is online, the serial number and software version will be displayed |
|                 | Power Module          | If the module is online, the serial number and software version will be displayed |
|                 | Battery Module        | If the module is online, the serial number and software version will be displayed |
| Redundant State | PM Installed          | The number of installed power modules   |
|                 | PM                    | Whether there are redundant power modules supplying power.                        |



**Table 22** Item description of menu window and data window (*continued*)

| Menu Name | Data Item             | Data Description  |
|-----------|-----------------------|---|
| Settings  | Set Redundancy Mode   | Disabled/ Enabled. If 'Enabled,' the system operational parameters will assume there is a redundant power module in the frame; if 'Disabled', the system operational parameters will assume that all power modules in the frame are not redundant.<br>Note: This item is closely related to the 'Redundant alarm' setting   |
|           | Remote Comms Shutdown | Disabled/ Enabled. If 'Enabled,' this allows the UPS output power to be shutdown through remote communication, including the dry contacts and IntelliSlot® communication cards.<br>Note: This item is closely related to 'Remote shutdown delay'  |
|           | Bypass Setting        | Enables the bypass to supply power or not   |
|           | Output Frequency      | Sets the output frequency to allow frequency conversion operation   |
|           | Output Voltage        | Sets the output voltage level to match the mains input voltage  |
|           | Inverter Sync Range   | Sets the range of inverter synchronization for bypass frequency operation and availability  |
|           | Remote Shutdown Delay | Sets the shutdown delay time for the remote signal operation  |
|           | Bypass Upper Limit    | Sets the upper limit of bypass voltage operation and availability   |
|           | Bypass Lower Limit    | Sets the lower limit of bypass voltage operation and availability   |
|           | Guaranteed Shutdown   | Disabled/ Enabled. If 'Enabled,' once a low battery alarm is generated during a battery discharge, the UPS will continue battery mode operation until it reaches the end of discharge (EOD) setpoint, then will shutdown output power, whether the AC mains recovers or not.  |
|           | Bypass Alarm Mode     | Allows an alarm to be generated when the bypass is abnormal   |
|           | Set RS232 Protocol    | Because the slot 2 and the serial port on the rear panel cannot work at the same time, you must select one of them to work. If 'INTERFACE2' is selected, the slot 2 can communicate; if 'RS232' is selected, the serial port can communicate.   |
|           | Auto-Restart Mode     | Allows auto restart after a EOD shutdown and AC mains returns   |
|           | Auto-Restart Capacity | Sets the battery capacity limit of auto restart feature. When AC mains power returns, the UPS will charge the battery to the specified battery capacity before enabling output power.   |
|           | Auto-Restart Delay    | Sets the delay time of auto restart feature. When AC mains power returns, the UPS will start a countdown timer based upon the setting before enabling output power.   |
|           | Display Contrast      | Adjusts the contrast of LCD backlighting  |
|           | Date and Time         | Sets date and time  |
|           | Command Password      | Users can change the command password to prevent unauthorized user from changing any user configurable settings. The default password is 1234567. Once the password is changed, the default password is no longer operational and users are then required to enter the new password to enter/change any 'Settings' or 'Battery settings'. If the new password is forgotten, contact your local customer service center for steps to reset the password back to the factory default. |
|           | Max Load Alarm        | Sets a maximum load alarm. This item is closely related to 'Max load threshold.'  |
|           | Max Load Threshold    | Sets the threshold of maximum load alarm. When the UPS loads exceed the threshold, and the maximum load alarm is enabled, an alarm will be generated. This item is closely related to 'Max load alarm,' for example, set this item to 5.0kVA, when the UPS loads exceed 5.0kVA, an alarm will be generated.   |
|           | Redundant Alarm Mode  | Allows alarm to be generated when the system loses redundant power module   |



**Table 22** Item description of menu window and data window (*continued*)

| Menu Name               | Data Item                       | Data Description   |
|-------------------------|---------------------------------|--|
| Settings<br>(continued) | Communication Address           | Sets the UPS device address. This setting is only for the network card communication of newly emerging market.   |
|                         | Air Filter Reminder             | Set the reminder period of checking dust-proof filter  |
|                         | Air Filter Type                 | Standard: Use this setting if air filter is not installed.<br>Fine Dust: Use this setting if air filter is installed.                                      |
|                         | IT System Compatibility         | Enabled - Neutral back-feed relay will open on battery mode<br>Disabled (Default) - Neutral back-feed relay is always closed                               |
|                         | UPS ID                          | Users can set the UPS name to facilitate managing the UPS through remote communications  |
|                         | Company Name                    | Set the local service company name of the UPS  |
|                         | Contact Number                  | Set the local service telephone number of the UPS  |
|                         | Load factory Defaults           | Restores the setting items in 'Settings' menu to factory values  |
| Battery settings        | Low battery Warning             | Sets the battery low voltage alarm time  |
|                         | Automatic Battery Test Interval | Sets the interval for the automatic battery test. Intervals of 8, 12, 16, 20, 26 weeks or Disable are available for selection. Factory default is 8 weeks. |
|                         | Auto Batt Test Start Day        | Sets the day of the week for the automatic battery test  |
|                         | Auto Batt Test Start Time       | Sets the time of the day for the automatic battery test  |
|                         | External Battery AH             | Sets the AH capacity of external third party battery system to calculate the battery capacity and estimate the battery time remaining                      |
|                         | Load Factory Defaults           | Restores the setting items in 'Battery set' menu to factory values   |
| Language                | Language Options                | Provides a selection of seven languages:<br>Chinese, English, French, Spanish, Italian, Russian and German   |
| Alarms                  | Current Alarms                  | Displays the current alarms. See <b>Table 25</b> for the UPS alarm list  |
| Records                 | Historical Alarms               | Displays all historical alarms. See <b>Table 25</b> for the UPS alarm list   |
| Module replacement      | LCD Module                      | Displays the procedures for replacing LCD module   |
|                         | Bypass Monitor Module           | Displays the procedures for replacing system monitor module  |
|                         | Bypass Control Module           | Displays the procedures for replacing system control module  |
|                         | Power Module                    | Displays the procedures for replacing power module   |
|                         | Battery Module                  | Displays the procedures for replacing battery module   |
|                         | Charger Module                  | Displays the procedures for replacing charger module   |



**Table 22** Item description of menu window and data window (*continued*)







| Menu Name | Data Item                        | Data Description  |
|-----------|----------------------------------|---|
| Service   | Battery Maintenance Test         | Battery maintenance test allows battery to discharge some voltage to obtain the battery activity. The loads must be within 0% ~ 90%, the battery capacity must be larger than 70%, and there is no battery fault and alarm in the system.           |
|           | Stop Battery Test                | Stops battery maintenance test  |
|           | System Test                      | A UPS self-test, used to test whether the LEDs are normal. When you start this function, 5 seconds later, the screen will prompt a window to display the system self-test result.   |
|           | Stop Testing                     | Stops system test manually  |
|           | Freshening Charge                | Boost charges the battery by force, manually  |
|           | Stop Freshening Charge           | Stops freshening charge manually  |
|           | UPS ID                           | Allows customer service personnel to set the UPS ID, to facilitate maintenance  |
|           | Site ID                          | Allows customer service personnel to set the UPS address, to facilitate maintenance   |
|           | Tag Number                       | Allows customer service personnel to set the UPS tag, to facilitate maintenance   |
|           | Company Name                     | Allows customer service personnel to set the UPS company name, to facilitate maintenance  |
|           | Contact Number                   | Allows customer service personnel to set the UPS company contact number, to facilitate maintenance  |
|           | Frame S/N                        | Reset this when replacing the LCD board. The frame S/N is labeled on the frame.   |
|           | Normal Mode                      | Allows customer service personnel to set the UPS operating mode to normal online mode   |
|           | ECO Mode                         | Allows customer service personnel to set the UPS operating mode to ECO mode   |
|           | Enable Max Discharge Protection  | By default, the UPS has a maximum discharge time to protect the batteries from a deep, slow discharge. After this time, the UPS will turn Off its output.   |
|           | Disable Max Discharge Protection | If this variable is set, there will be no time limit and the UPS will stay on battery until the EOD setpoint is reached. This may cause damage to some battery types and should only be used for DC sources that do not have slow discharge issues. |

The Service screen is only for customer service personnel; it is not open to the user.

### Keyboard Window

For the functions of the menu buttons (F1 ~ F5) in the keyboard window, see **Table 23**

**Table 23** Function descriptions of menu buttons

| Button     | F1  | F2       | F3  | F4  | F5   |
|------------|---|----------|---|---|--|
| Function 1 | <br>HOME | —        | <br>To Left | <br>To Right | <br>Enter |
| Function 2 | —   | ESC Exit | <br>Up      | <br>Down     | —  |



### 4.2.3 Default Screen/Screen Saver

During the UPS operating process, if there are no active alarms, the LCD will go into a screen saver mode after 2 minutes of no user navigation activity. The default screen saver is shown in **Figure 55**. After a brief delay, the LCD backlight will also turn Off. Pressing any button will return to the original screen.

**Figure 55** Default screen/screen saver



## 4.3 LCD Screen Views

This section gives a detailed description of each display screen and its contents. The default “main screen” is the Output menu and its data. The navigation indicated for each screen below is in reference to the Output screen.

### 4.3.1 AC Mains Screen

From the main screen, press the F3 button twice, until the AC mains screen is displayed, as shown in **Figure 56**.

**Figure 56** Mains screen

| SolaHD S5KC Series   |       | 2013-08-01<br>10:45:20 |       |
|--|-------|------------------------|-------|
|  | L1    | L2                     | L3    |
| L-N voltage (V)  | 220.0 | 220.0                  | 220.0 |
| L-N current (A)  | 30.3  | 30.3                   | 30.3  |
| Frequency (Hz)   | 50.00 | 50.00                  | 50.00 |
| L-L voltage (V)  | 380.0 | 380.0                  | 380.0 |
| Sout (kVA)   | 6.67  | 6.67                   | 6.67  |
| Power factor   | 1.00  | 1.00                   | 1.00  |
| Mains  |       |                        |       |
| <div> <div></div> <div>⊖</div> <div>---</div> <div>⊕</div> <div>▶</div> </div> |       |                        |       |
| <div> <div>⏠</div> <div>⇒</div> </div>   |       |                        |       |

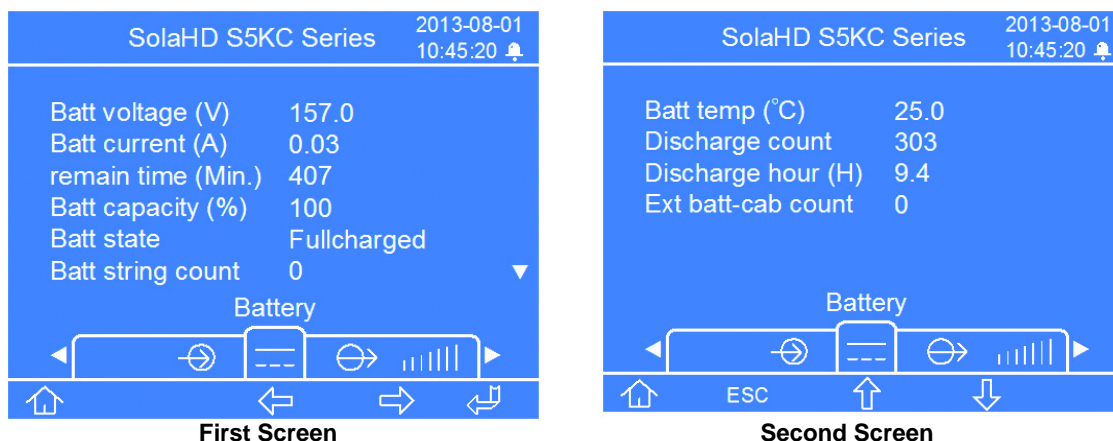
The AC mains screen displays the input L-N voltage, L-N current, input frequency, L-L voltage, apparent power and power factor of three phases (L1, L2, L3).



### 4.3.2 Battery Screen

From the main screen, press the F3 button once and the battery screen will be displayed, as shown in **Figure 57**.

**Figure 57 Battery screens**



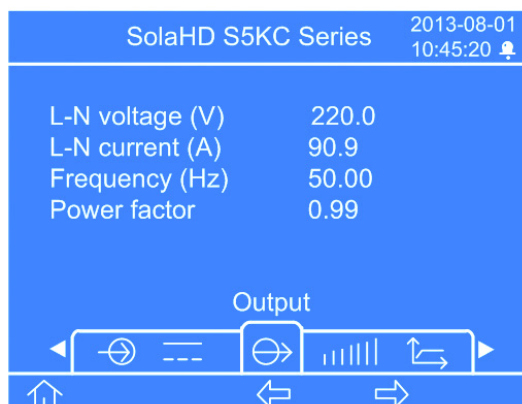
On the first battery screen, pressing the F5 button will change the function of the F2, F3, and F4 buttons from the primary functions to the secondary functions, as shown above in **Table 23**.

The battery screen displays Battery voltage, Battery current, Battery time remaining, Battery capacity, Battery state, Battery string count, Battery temperature, cumulative discharge count (highest of all installed battery modules), cumulative discharge time (in hours) and External battery cabinet count.

### 4.3.3 Output Screen

The main screen is the output screen by default, as shown in **Figure 58**.

**Figure 58 Output screen**



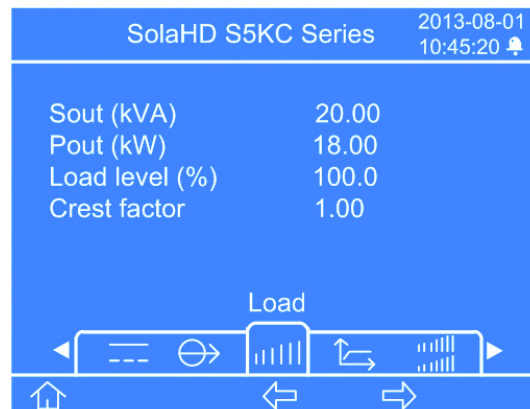
The output screen displays L-N or L-L voltage, L-N or L-L current, Frequency and Power factor.



#### 4.3.4 Load Screen

From the main screen, press the F4 button once and the load screen will be displayed, as shown in **Figure 59**.

**Figure 59 Load screen**

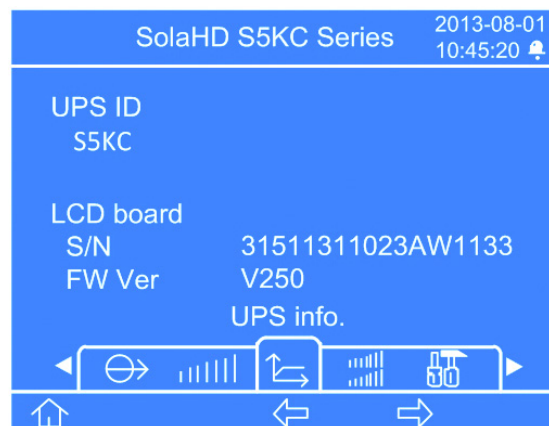


The load screen displays output kVA (Sout/apparent power), output kW (Pout/active power), load level and crest factor.

#### 4.3.5 UPS Information Screen

From the main screen, press the F4 button twice until the UPS info screen is displayed as shown in **Figure 60**.

**Figure 60 UPS info screen**



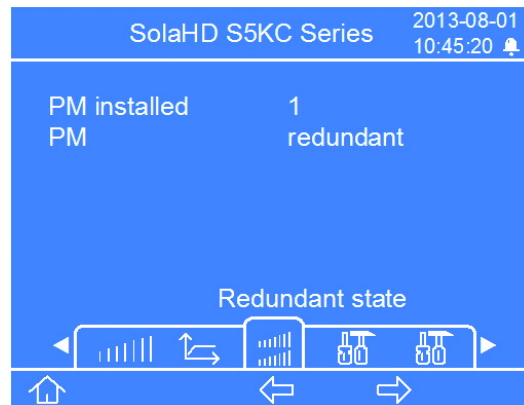
The UPS information screen displays UPS ID (name set by user), serial number and software version of LCD module, system monitor module, system control module, charger module, power module and battery module (if the modules are installed and are online).



### 4.3.6 Redundancy Screen

From the main screen, press the F4 button three times until the redundancy screen is displayed, as shown in **Figure 61**.

**Figure 61** Redundancy screen



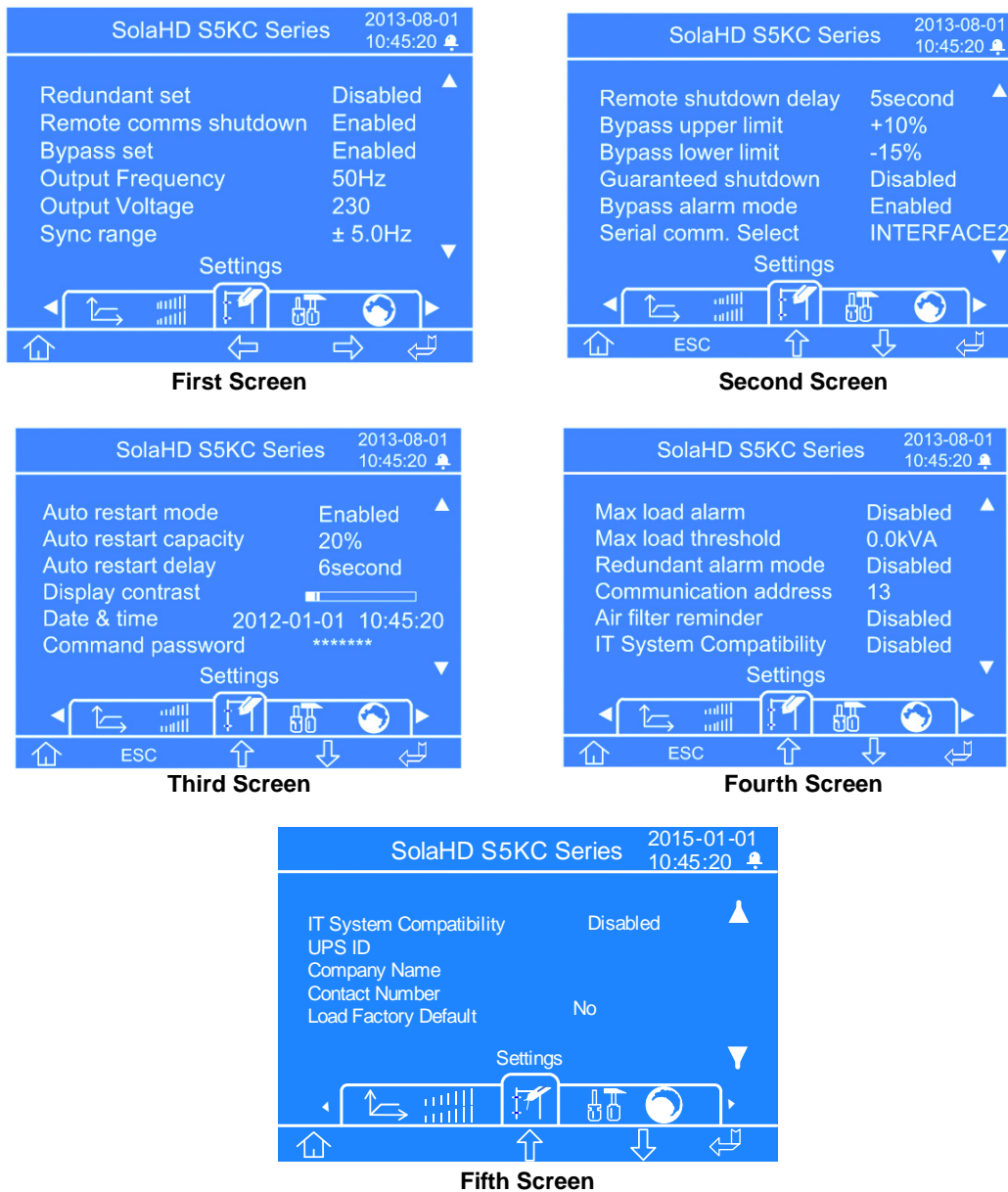
The redundant screen displays the number of installed power modules in the frame, and whether the system contains a redundant module or not.



### 4.3.7 Settings Screen

From the main screen, press the F4 button four times until the settings screen is displayed. The settings screen is displayed in a total of nine screens as you scroll down, as shown in **Figure 62**.

**Figure 62 Settings screens**



On the first settings screen, pressing the F5 button will prompt a password window to pop up. After you enter the correct password, the function of the F2, F3, and F4 buttons will switch from the primary functions to the secondary functions, as shown in **Table 23**.

### 4.4 Entering a Password

1. On the password prompt window, press the F5 button, the first digit will become editable, press the F3 button to enter the correct number.
2. Press the F4 button, the second digit will become editable, press the F3 button to enter the correct number.
3. Enter the rest of the password digits using the same method in **Step 2**, and press the F5 button when complete.



## 4.5 Setting or Changing a Parameter Setting

1. Press the F4 button to navigate to the parameter to be set, and press the F5 button to enter the edit mode.
2. Press the F3 or F4 button to select the setting item or change the setting value, then press the F5 button to confirm the setting. Press the F2 button to exit the edit setting mode.

### 4.5.1 Battery Setting Screen

From the main screen, press the F4 button five times until the battery settings screen is displayed, as shown in **Figure 63**.

**Figure 63 Battery settings screen**



On the first settings screen, pressing the F5 button will prompt a password window to pop up. After you enter the correct password, the function of the F2, F3, and F4 buttons will switch from the primary functions to the secondary functions as shown above in **Table 23**. Refer to the notes listed above in **4.3.7 - Settings Screen** for entering the password and making changes to the battery setting parameters.

### 4.5.2 Language Selection Screen

From the main screen, press the F4 button six times until the language screen is displayed, as shown in **Figure 64**.

**Figure 64 Language selection screen**



The language selection screen displays a choice from seven languages: Chinese, English, German, Russian, French, Italian and Spanish.



#### NOTE

*The languages are displayed in their alphabet.*

To set the language:

1. Press the F5 button, the language option is highlighted.
2. Press the F3 or F4 button to navigate to the desired language.
3. Press the F5 button to confirm the selection. Once the screen language changes, press the F2 button to exit the language setting mode.



### 4.5.3 Alarms Screen

From the main screen, press the F4 button seven times until the alarms screen is displayed, as shown in **Figure 65**.

**Figure 65 Alarms screen**



The alarms screen displays any current alarms of the UPS, including the alarm name, alarm ID code and alarm date/time stamp.

### 4.5.4 Records Screen

From the main screen, press the F4 button eight times until the records screen is displayed, as shown in **Figure 66**.

**Figure 66 Records screen**



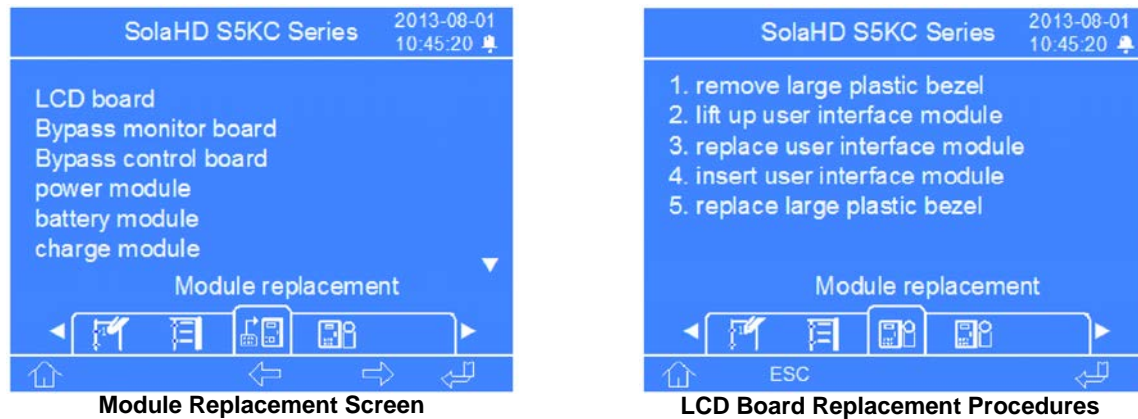
The records screen displays all historical alarms of the UPS, including the alarm name, alarm ID code, alarm date/time stamp and record number/total record count.



### 4.5.5 Module Replacement Screen

From the main screen, press the F4 button nine times until the module replacement screen is displayed, as shown in **Figure 67**.

**Figure 67** Module replacement screen



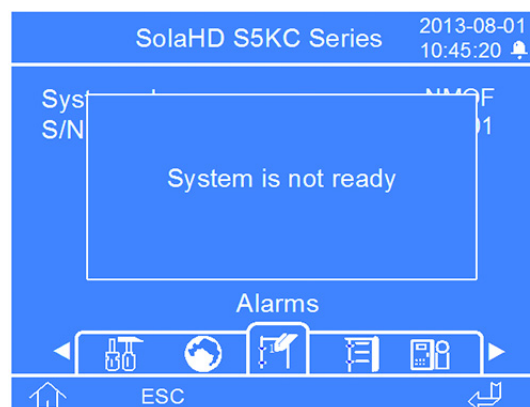
The module replacement screen displays the procedures for replacing all user replaceable module assemblies in the UPS frame.

To view the procedure, press the F5 button to enter the module replacement. One module option is highlighted. Press the F3 or F4 button to navigate to the specific module procedures, and then press the F5 button to view the procedures. Once completed, press the F2 button to exit.

### 4.5.6 Prompt Window

During system operation, occasionally the UPS system needs to alert or remind the user of alarm notifications or require the user to confirm a command or perform other operations. When this occurs, a prompt window will pop up, as shown in **Figure 68**. Refer to **Table 23** below for possible prompts and the descriptions/actions to be taken.

**Figure 68** Example of prompt window





**Table 24 Information and actions required for the prompt window**

| Prompt Window   | Explanation  |
|---|--|
| Turn On/Off:<br>Turn On UPS<br>Cancel   | When you press the ON/OFF-button while UPS is Off.   |
| Turn On/Off:<br>Turn On INV<br>Turn Off UPS   | When you press the ON/OFF-button while UPS is operating on bypass mode.  |
| Turn On/Off:<br>Transfer to Bypass<br>Cancel  | When you press the ON/OFF-button while UPS is operating on inverter mode and bypass is qualified.  |
| Turn On/Off:<br>Turn Off UPS<br>Cancel  | When you press the ON/OFF-button while UPS is operating on inverter mode and bypass is not qualified.  |
| Enter password<br>*****   | After the control password is changed, you are required to enter the password when you want to enter "Settings," "Battery set" and "Service" screens.  |
| Output must be Off  | While the UPS output is supplying power, this prompt appears when you want to set some key system parameters. You need to close the output before setting key parameters.  |
| On manual bypass<br>can't turn Off the load   | This prompt appears when UPS operates on manual bypass and the ON/OFF button is pressed.   |
| Please verify output settings before<br>starting the UPS<br>Escape: Ignore this message<br>Enter: Go to Settings Screen | After the UPS is powered on, When you press the ON/OFF button for the first time, this prompt appears to remind you of viewing relevant setting.   |
| Short Circuit Recovery  | After the UPS output short circuits, wait 30 seconds before turning On the UPS again.  |
| System is not ready   | When the power modules in the frame is initializing or there are no power modules, this prompt appears when you press the ON/OFF button.   |
| AC input not qualified,<br>cannot start UPS   | When the input voltage cannot meet the startup condition of the inverter, this prompt appears when you press the ON/OFF button.  |
| Please check air filter   | When you set "Enabled" for "Air filter reminder," this prompt appears after the reminder time is up.   |
| Removal of module will result<br>in loss of output power  | When only one of the system monitor module OR system control module is installed and active, when the locking level is moved to the unlock position, this prompt appears to remind user of loss of output power will occur if the module is removed from the system. |
| New Alarms Present<br><br>Escape: Ignore this message<br>Enter: Go to Alarms Screen                                     | This prompt appears when a new alarm occurs.   |
| Warning! Frame Fan Fault<br><br>Reduce load or replace fan<br>to avoid damage to bypass                                 | This prompt appears when frame fan is in fault and load is heavy, user should reduce load or replace fan   |
| Bypass source not qualified<br>Can not switch to bypass   | This prompt appears when bypass source is not qualified and inverter can't power on the load for transformer based frame   |



## 5.0 TROUBLESHOOTING

This chapter provides the basic troubleshooting guide and required actions for maintaining the SolaHD S5KC system.

### 5.1 Active Alarms

In the event of an alarm, the User Interface LCD will display the latest alarm message. A list of possible alarm messages are displayed in **Table 25**. If an alarm occurs and you are uncertain of the corrective action to take, contact your local Emerson SolaHD service representative.

**Table 25 Alarm message list**

| Alarm Message                           | Possible Cause   | Corrective Action   |
|---|--|---|
| Power Module Warning                    | One or more power modules is not operating correctly.                                | View the corresponding module serial number in the fault logs or event logs and contact your local SolaHD service representative.   |
| Power Module Fail                       | One or more power modules has a fault.   | View the corresponding module serial number in the fault logs or event logs and either replace the module or contact your local SolaHD service representative.  |
| Power Module Over Temp Warning          | One or more power modules is operating at an internal high temperature.              | Check the air filters located behind the bezels and clean if necessary, or check to see if the ambient temperature is too high. If these conditions do not exist, contact your local Emerson personnel.             |
| Power Module Over Temp Shutdown         | One or more power modules has stopped operating due to an internal over temperature. | Check the air filters located behind the bezels and clean if necessary, or check to see if the ambient temperature is too high. If these conditions do not exist, contact your local SolaHD service representative. |
| Power Module Fan Failure                | One or more of the power module fans has failed.                                     | Check to see if the fan is blocked. If not, contact your local SolaHD service representative.   |
| Insufficient Capacity To Start Inverter | The load value exceeds the maximum load capacity of all operating modules.           | Ensure all power modules are inserted and the locking lever is fully inserted. If all modules are active, add power modules to increase capacity or contact your local SolaHD service representative.               |
| PM Locking Lever In Remove Position     | The power module locking lever is not in the locked position.                        | Check the locking lever to ensure it is fully inserted. If so, contact your local SolaHD service representative.  |
| Input Phase A Not Qualified             | A-phase voltage is too high or too low.  | Check the upstream feeder breaker or the UPS input breaker and reset if necessary, or contact your local SolaHD service representative.   |
| Input Phase B Not Qualified             | B-phase voltage is too high or too low.  | Check the upstream feeder breaker or the UPS input breaker and reset if necessary, or contact your local SolaHD service representative.   |
| Input Phase C Not Qualified             | C-phase voltage is too high or too low.  | Check the upstream feeder breaker or the UPS input breaker and reset if necessary or contact your local SolaHD service representative.  |
| L1L2 Phase Reversed                     | Two phases are reversely connected.  | Have a qualified electrician check the phase rotation at the distribution panel and/or at the UPS input terminal block. If this is not the problem, contact your local SolaHD service representative.               |



**Table 25 Alarm message list (continued)**

| Alarm Message                                    | Possible Cause  | Corrective Action  |
|--|---|--|
| Battery Reversed                                 | The battery is reversely connected.   | Have a qualified electrician check the wiring rotation at the external battery cabinet. If this is not the problem, contact your local SolaHD service representative.  |
| No Battery Modules Are Ready                     | The battery module is not ready, and the yellow fault LED flashes.  | Ensure that the battery module is fully inserted and locking levers are in the locked position. If this is not the problem, contact your local SolaHD service representative.  |
| All PM's Are Not Ready                           | The power module is not ready, and the yellow fault LED flashes.  | Ensure that the power module is fully inserted in the upper frame bays and locking levers are in the locked position. If this is not the problem, contact your local SolaHD service representative.  |
| Power Module Redundancy Alarm                    | The UPS has no redundant power module   | Add power modules or replace the faulty power module to obtain redundancy, or contact your local SolaHD service representative.  |
| Output Exceeds Max Load Setting                  | The maximum load alarm is effective, the actual load is larger than the setting   | Either decrease load on the UPS or readjust the user programmable alarm set point from the LCD. It might also require another power module to increase capacity. If this is not the problem, contact your local SolaHD service representative.                                 |
| Turn Rocker Switch Off Before Removing           | The bypass power is unqualified or the system output is disconnected. There is only one system monitor module or one system control module in the system, and the control lever is removed. The alarm reminds you to open the startup switch before pulling out the control module. | Open the startup switch.   |
| Time to Check the Fan Filters for Excessive Dirt | When the air filter reminder is 'Enabled,' this message appears to remind users to check the air filters.   | Check the air filters and clean them if necessary, or contact your local SolaHD service representative.  |
| No Matching Module                               | Only one battery module is inserted into one row of bays in the system.   | Ensure that there are a pair of battery modules in the same row of the frame, or contact your local SolaHD service representative.   |
| Load Exceeds Battery Module Capacity             | The system has determined the load exceeds the capacity of the battery.   | Check to ensure that all battery modules are fully inserted and the locking lever is in the locked position. It is possible that more battery modules are required to increase battery run time. If this is not the problem, contact your local SolaHD service representative. |
| Battery Cabinet Not Connected                    | The power cable of the external battery cabinet is not connected or fully inserted.   | Connect the cable or contact your local SolaHD service representative.   |
| BM Lock Lever in Remove Position                 | The locking lever is not in the locked position.  | Check the locking lever to ensure it is fully inserted. If so, contact your local SolaHD service representative.   |
| BM Over Temperature Warning                      | The internal battery module temperature is at an elevated level.  | Check the air filters located behind the bezels and clean if necessary, or check to see if the ambient temperature is too high. If this is not the problem, contact your local SolaHD service representative.  |



**Table 25 Alarm message list (continued)**

| Alarm Message  | Possible Cause  | Corrective Action   |
|--|---|---|
| Low Battery Warning                                    | The battery capacity has reached the user programmable set point.   | Check upstream feeder breaker or the UPS input breaker and reset if necessary. If this is not the problem, begin the orderly shutdown of all connected equipment as UPS shutdown is imminent.                 |
| Battery Module Warning                                 | One or more battery modules is abnormal.  | View the corresponding module serial number in the fault logs or event logs and contact your local SolaHD service representative.   |
| Battery Module Fail                                    | One or more battery modules has a fault.  | View the corresponding module serial number in the fault logs or event logs and either replace the module or contact your local SolaHD service representative.  |
| Battery Test Warning Weak Battery                      | One or more battery modules has detected batteries that are no longer in specification due to age or operating conditions.                | Replace the battery string or contact your local SolaHD service representative.   |
| BM Temp Unbalance                                      | The temperature difference between all the battery modules exceeds 10°C.  | Check the air filters located behind the bezels and clean if necessary, or check to see if the ambient temperature is too high. If this is not the problem, contact your local SolaHD service representative. |
| Frame Fan Failure                                      | The fan located behind the display panel has failed.  | Contact your local SolaHD service representative for fan replacement.   |
| Transformer Fan Failure                                | There is a transformer on the UPS frame and at least one transformer fan has failed.  | Contact your local SolaHD service representative for fan replacement.   |
| Transformer Temperature Warning                        | A high temperature condition has occurred in the output transformer area.   | Check the air filters located behind the bezels and clean if necessary, or check to see if the ambient temperature is too high. If this is not the problem, contact your local SolaHD service representative. |
| Bypass Source Not Qualified                            | The UPS bypass functionality is not available because the input source is out of tolerance to the bypass voltage and/or frequency window. | No action necessary unless the AC input has been verified within bypass settings. If this is not the problem, contact your local SolaHD service representative.   |
| Output Is Off<br>Abnormal Output Volt                  | The cable connection is wrong.  | Check the power distribution.   |
| System Control Module Lock<br>Lever in Remove Position | The locking lever is not in the locked position.  | Check the locking lever to ensure it is fully inserted. If so, contact your local SolaHD service representative.  |
| System Monitor Module Lock<br>Lever in Remove Position | The locking lever is not in the locked position.  | Check the locking lever to ensure it is fully inserted. If so, contact your local SolaHD service representative.  |
| Charger Module Warning                                 | The charger module is not operating correctly.  | View the corresponding module serial number in the fault logs or event logs, and contact your local SolaHD service representative.  |
| Charger Module Fail                                    | The charger module has a fault.   | View the corresponding module serial number in the fault logs or event logs, and either replace the module or contact your local SolaHD service representative.   |
| CM Power source Is Not<br>Qualified                    | Check the power distribution.   | Check upstream feeder breaker or the UPS input breaker and reset if necessary, or contact your local SolaHD service representative  |



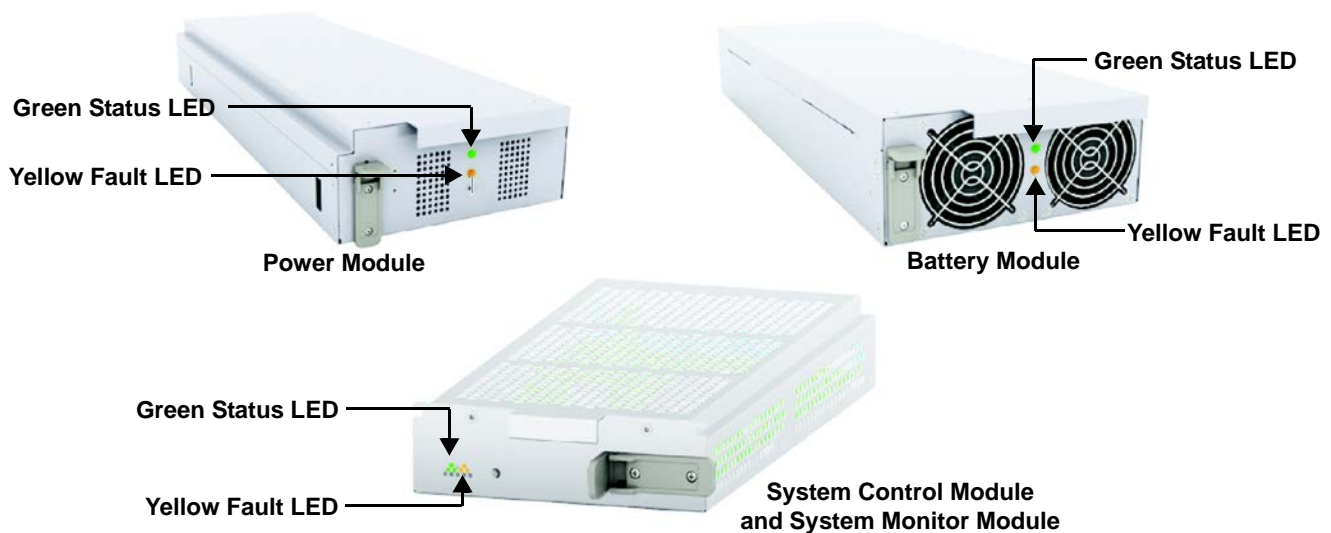
**Table 25 Alarm message list (continued)**

| Alarm Message                                | Possible Cause  | Corrective Action   |
|--|---|---|
| Charger Module LOCK Lever in Remove Position | The locking lever is not in the locked position.                          | Check the locking lever to ensure it is fully inserted. If so, contact your local SolaHD service representative.  |
| Charger Module Fan Failure                   | One or more of the charger module fans has failed.                        | Check to see if the fan is blocked. If not, contact your local SolaHD service representative.   |
| Charger Module Temperature Warning           | One or more charger modules is operating at an internal high temperature. | Check the air filters located behind the bezels and clean if necessary, or check to see if the ambient temperature is too high. If this is not the problem, contact your local SolaHD service representative. |

## 5.2 Module Troubleshooting

The power, battery, charger, system control and system monitor module have two LEDs each to indicate the module operating state. **Figure 69** shows the location of these LEDs; the meaning of the LED indicators is detailed in **Table 26**.

**Figure 69 Module LED location**



**Table 26 Descriptions of module LEDs**

| Green Status LED | Yellow Fault LED | Descriptions of Module State  |
|------------------|------------------|---|
| Off              | Off              | The module is not inserted into the frame, lock lever is in unlocked position or the system is off                  |
| Off              | On               | The module is initializing (maximum 30 seconds <sup>1</sup> )   |
| Flashing         | Off              | The module is operating normally  |
| Flashing         | Flashing         | The module is in startup mode or the module has an alarm <sup>2</sup>   |
| Flashing         | On               | The module is faulty and off-line, and the control module is operating  |
| Off              | Flashing         | The module is not operating correctly, re-insert the module. If this persists, contact technical support personnel. |
| On               | Off              |   |
| On               | On               |   |
| On               | Flashing         |   |

1. If this condition persists for more than 30 seconds, verify that the lock lever is in the locked position; if it is not, the module is faulty.

2. If both green and yellow LEDs are flashing for more than 30 seconds, reinsert module.



## 5.3 Module Replacement

Follow the instructions below when replacing or adding a system control, system monitor, power, battery, or charger module. Contact your local SolaHD representative if you need to purchase additional modules to expand your system or contact authorized your Emerson representative for replacement modules.

### 5.3.1 Removing Modules

## NOTICE

Risk of unintended shutdown. Can cause equipment damage.

Do not remove both the control and the monitor modules at the same time. Removing both the control module and monitor module at the same time will cause the UPS to shut down and remove power from the load. Replace these modules one at a time.

1. Remove bezel cover to locate the faulty module. The yellow fault LED will be illuminated on the faulty module.



### NOTE

*When removing bezels from a transformer-based UPS, note which have filters and replace them accordingly. Bezels from the modules will have air filters. There will be no filters on the bottom three transformer bezels. The transformer has a separate air filter.*

*For module removal, after unlocking the lever, wait a few seconds to remove the module.*

*If your system does not contain a redundant module, you may need to manually place the UPS into manual bypass before removing modules to avoid accidental loss of output power for the connected equipment.*

2. The method for removing a module varies depending on the module type. The two methods are as follows:
  - When removing a **power, battery or charger module**, use a Phillips screwdriver to remove the fastener (if installed). Then pull out the lock lever slightly and lift up to unlock the module.
  - When removing a **system control or system monitor module**, use a Phillips screwdriver to remove the two screws from the securing holes on each end. Then pull out the lock lever slightly and slide it to the left to unlock the module.

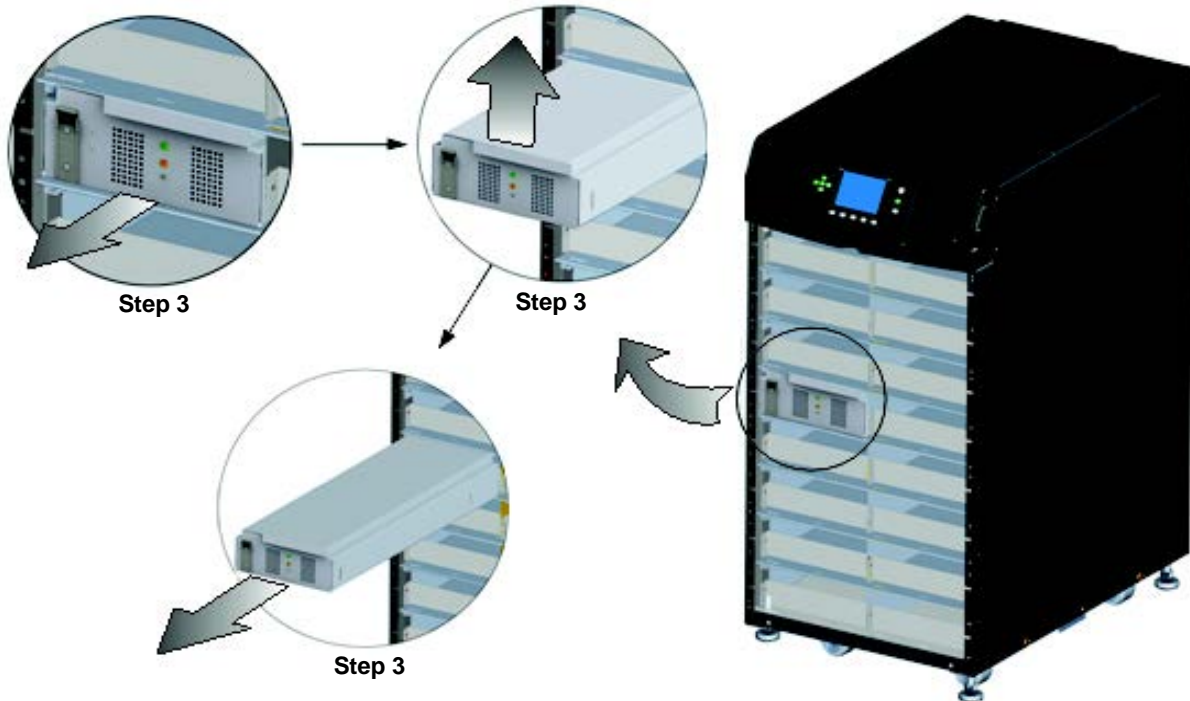
Figure 70 Lever and fastener



3. To pull out a power, charger or battery module:
  - a. When removing a power module, charger module or battery module: slide it 2/3 of the way out. It will be stopped by the safety catch.
  - b. Lift the module up slightly while continuing to pull it out as shown in **Figure 71**.
  - c. Support the module and slide it completely out of the unit.
  - d. When removing a system control or a system monitor module, there is no safety catch because the modules are lightweight.



Figure 71 Pull out a battery module, a power module or a charge module



## WARNING

Risk of heavy unit falling over. Can cause equipment damage, injury or death.

Read all of the instructions before attempting to move the unit, lift it, remove packaging or prepare the unit for installation.

The UPS presents a tipping hazard. Do not remove more than one module at a time. Failure to do so may cause unit to tip over and cause serious injury.

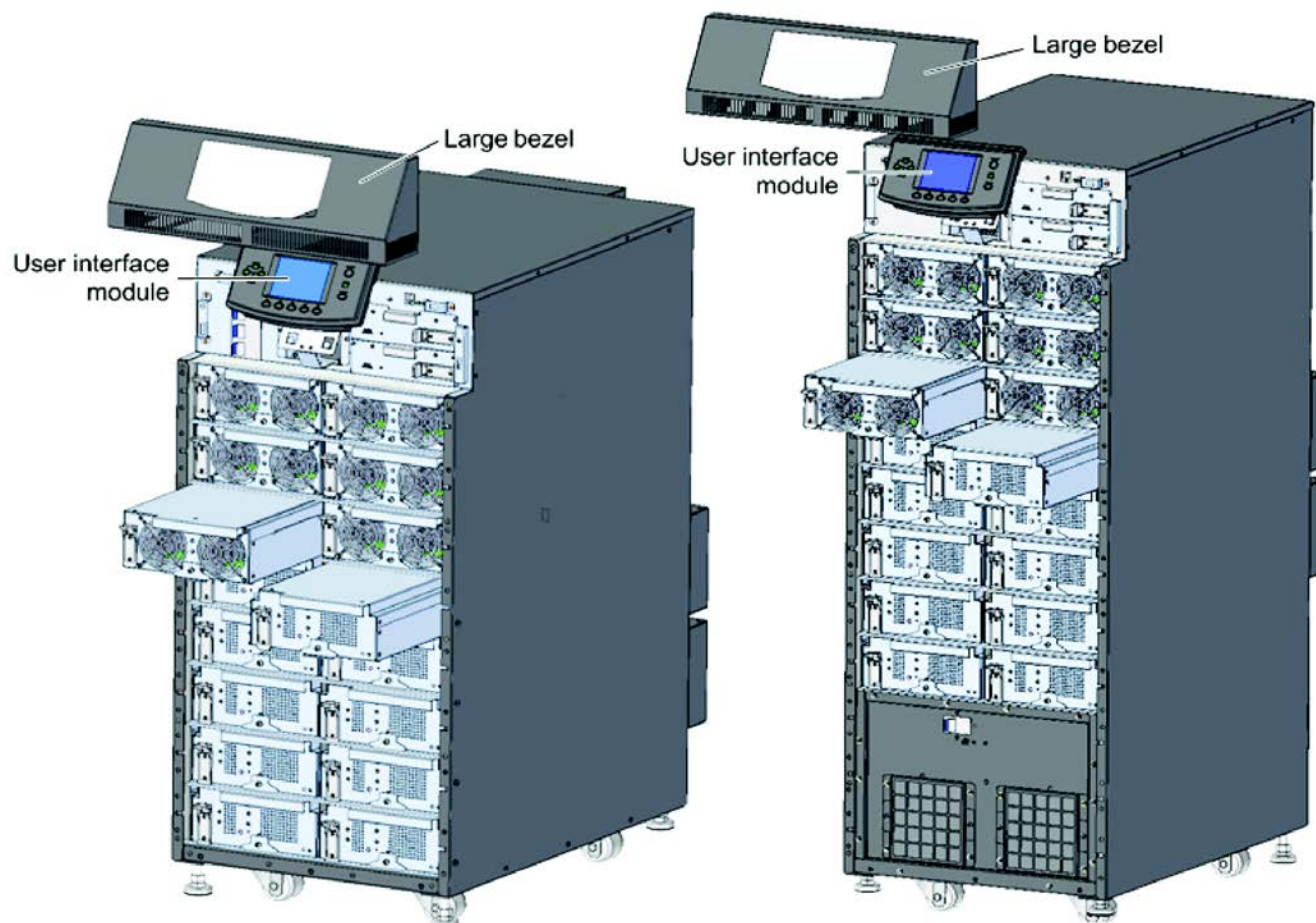
### 5.3.2 Replacing the User Interface Module

Replace the User Interface Module only while the SolaHD S5KC is turned On (System Enable switch On and input power available). If this module is replaced while the UPS is Off, the UPS settings will be reset to factory defaults when the UPS is powered On with the new User Interface Module installed.

1. Remove the display bezel on top of the frame.
2. Lift up the user interface module, and put it on top of the UPS frame.
3. Disconnect the network cable from the user interface module.
4. Connect the network cable to the new user interface module.
5. Insert the new user interface module into the clips and replace the display bezel.



Figure 72 Replacing the user interface module





## 6.0 MAINTENANCE

This chapter describes the routine maintenance for the SolaHD S5KC UPS, including proper care, scheduled maintenance and procedures for cleaning fan filters.

### 6.1 Proper Care

Proper maintenance of the UPS is imperative to optimal performance and life of the unit. Emerson recommends that a certified technician perform preventive and corrective maintenance. Emerson is dedicated to ensuring the highest level of performance and unmatched support for your UPS. Contact your local SolaHD service representative for service.

### 6.2 Scheduled Maintenance

Emerson recommends performing the following maintenance at least monthly:

- Clean unit.
- Clean or replace filters.
- Verify proper airflow.

Emerson recommends performing the following maintenance annually:

- Verify that all power modules are operating properly.
- Verify that all battery modules are operating properly.
- Verify redundancy (if applicable).

### 6.3 Cleaning Fan Filters

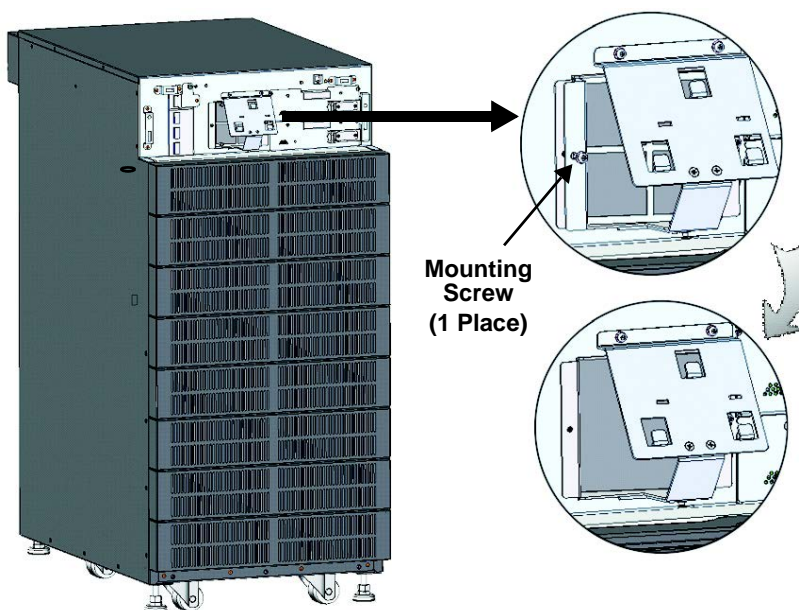
The intake fans contain filters that will need to be replaced or cleaned periodically, depending on the surrounding environment. Check filters; replace if they are very dirty or damaged.

To clean filters, either use a vacuum to remove the dirt and dust or rinse out the filters under running water (with the dirt side down) to remove dirt and dust. Blot the filters dry with a towel and allow air-drying before reinstalling it.

#### 6.3.1 Top Filter

1. Remove the display bezel.
2. Remove the user interface module, and lay it on top of the UPS frame.
3. Remove the two screws on the LCD mounting plate
4. Remove the screw in the middle of the filter assembly, remove the filter, as shown in **Figure 73**, and clean the filters as described above.
5. Replace the filter, mounting plate, user interface module and display bezel.

**Figure 73** Replace/clean the top filter

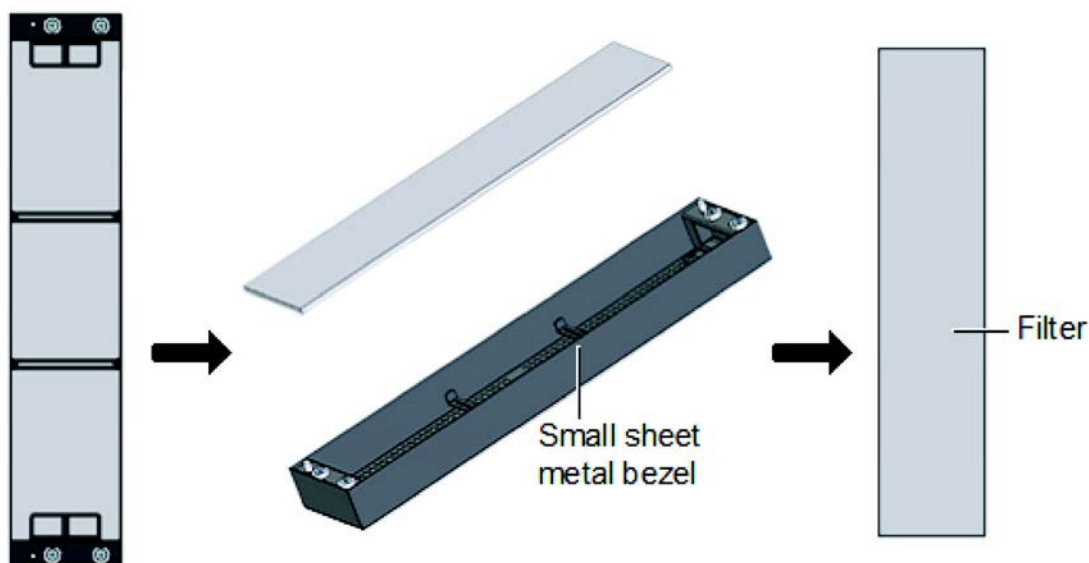




### 6.3.2 Bezel Filter

1. Remove the bezel from the frame.
2. Remove the filter assembly from the bezel, as shown in **Figure 74**, and clean the filters as described above.
3. Restore the filter and small bezel of the frame.

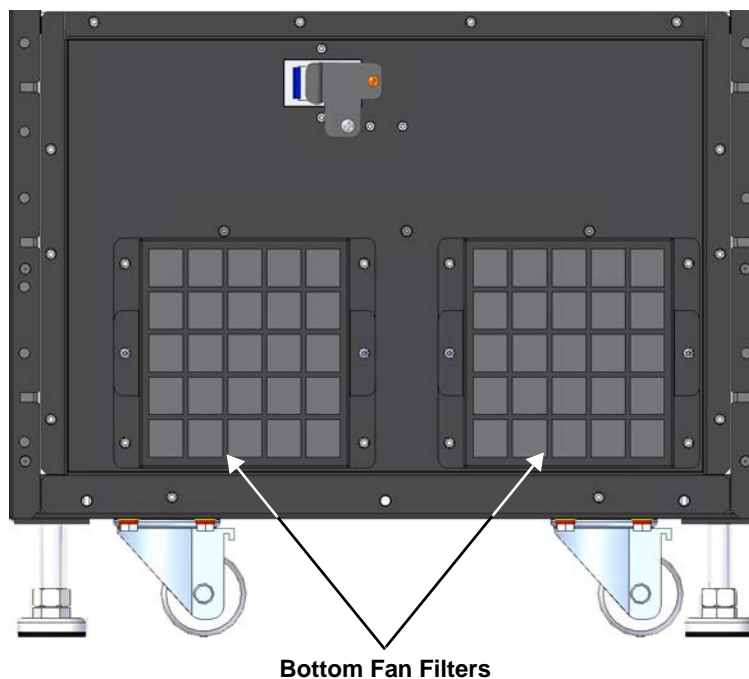
**Figure 74** Replace/clean the bezel filter



### 6.3.3 Bottom Fan Filter—Transformer-Based Frames Only

1. Remove the three lower bezels at the bottom of the frame.
2. Remove the screws and take out the filter, as shown in **Figure 75**, and clean the filters as described above.
3. Replace the filter and bezels.

**Figure 75** Replace/clean the bottom fan filter





## 7.0 SPECIFICATIONS

**Table 27 SolaHD S5KC specifications**

| Unit Size, Type                          | 10 Bay   | 16 Bay                    | 12 Bay                     | 16 Bay                     | 10 Bay  | 16 Bay                    |
|--|--|---------------------------|----------------------------|----------------------------|---|---------------------------|
|  | No Transformer   |                           | Transformer-based          |                            | No Transformer Dual Inverter  |                           |
| Frame Rating, kVA/kW                     | 15/13.5  | 20/18                     | 15/13.5                    | 20/18                      | 15/13.5   | 20/18                     |
| General & Environmental                  |  |                           |                            |                            |   |                           |
| Conducted and Radiated EMC Levels        | IEC/EN/AS 62040-2 Cat 2, CISPR22 Class A, FCC Part 15 Class A                    |                           |                            |                            |   |                           |
| Compliant Safety Standards               | IEC/EN/AS 62040-1:2008, UL 1778 4 <sup>th</sup> Ed and CSA 22.2 No. 107.3        |                           |                            |                            | UL 1778 4 <sup>th</sup> Ed and CSA 22.2 No. 107.3   |                           |
| Compliant Immunity Standards             | IEC/EN/AS 61000-4-2, 3, 4, 5, 6  |                           |                            |                            |   |                           |
| Transportation                           | Individual packaged modules meet ISTA-1A / 1B; the complete system meets ISTA-1E |                           |                            |                            |   |                           |
| Environmental                            | WEEE and ROHS2 (6 by 6), REACH Compliant   |                           |                            |                            |   |                           |
| Protection Degree IEC60529               | IP 20  |                           |                            |                            |   |                           |
| Color                                    | RAL 7021   |                           |                            |                            |   |                           |
| Dimensions, W x D x H, in (mm)           |  |                           |                            |                            |   |                           |
|  | 17x32x27<br>(440x800x695)  | 17x34x38<br>(440x850x970) | 17x32x42<br>(440x800x1060) | 17x34x49<br>(440x850x1240) | 17x32x27<br>(440x800x695)   | 17x34x38<br>(440x850x970) |
| Weight, lb. (kg)                         |  |                           |                            |                            |   |                           |
| Unit Weight (empty frame)                | 280 (127)  | 320 (145.1)               | 510 (231.3)                | 540 244.9)                 | 280 (127)   | 320 (145.1)               |
| Shipping Weight (empty frame)            | 320 (145.1)  | 360 (163.3)               | 550 (249.5)                | 580 (263.1)                | 320 (145.1)   | 360 (163.3)               |
| Unit Weight (frame rating populated)     | 565 (256.3)  | 700 (317.5)               | 795 (360.6)                | 920 (417.3)                | 565 (256.3)   | 700 (317.5)               |
| Shipping Weight (frame rating populated) | 605 (274.4)  | 740 (335.7)               | 835 (378.7)                | 960 (435.4)                | 605 (274.4)   | 740 (335.7)               |
| Environmental                            |  |                           |                            |                            |   |                           |
| Operating Temperature                    | 32 - 104°F (0 - 40°C)  |                           |                            |                            |   |                           |
| Relative Humidity                        | 0 - 95%, non-condensing  |                           |                            |                            |   |                           |
| Altitude                                 | 10,000 ft. @ 77°F) (3000m @ 25°C)  |                           |                            |                            |   |                           |
| Efficiency (AC-AC), %                    | 91.8-92.0  | 91.6-92.0                 | 88.5-89.9                  | 88.6-89.7                  | 90.4-91.0   | 90.0-91.0                 |
| Nominal Heat Dissipation (maximum)       | 4208 BTU/Hr  | 5747 BTU/Hr               | 5528 BTU/Hr                | 7965 BTU/Hr                | 4904 BTU/Hr   | 6768 BTU/Hr               |
| Acoustic Noise Level, dBA                | < 55dB (≤ 50% load), < 65dB (51-100% load) @ 1 meter                             |                           |                            |                            |   |                           |
| Input Data                               |  |                           |                            |                            |   |                           |
| Nominal Input Voltage, VAC               | 200/208/220/230/240; Single-Phase  |                           |                            |                            | 200/100, 220/110, 230/115, 240/120, 254/127, 208/120, 173/100, 190/110, 200/115, 220/127; Two-Phase |                           |
|  | 380/400/415; Three-Phase   |                           | —                          | —                          |   |                           |
| Input Voltage Range                      | The input voltage range based on the output loading, refer to <b>Table 28</b>    |                           |                            |                            |   |                           |
| Power Factor, Cos                        | Single-Phase Input, ≥ 0.99; Three-phase Input, ≥ 0.95                            |                           | Single-Phase Input, ≥ 0.99 |                            |   |                           |
| Input Frequency, Nominal                 | 50/60 Hz   |                           |                            |                            |   |                           |
| Input Current Distortion, THDi           | ≤ 5%   |                           |                            |                            |   |                           |
| Input Frequency Range                    | 40 to 70Hz auto-sensing  |                           |                            |                            |   |                           |



Table 27 SolaHD S5KC specifications (continued)

| Unit Size, Type                      | 10 Bay   | 16 Bay  | 12 Bay            | 16 Bay | 10 Bay  | 16 Bay |
|--------------------------------------|--|---|-------------------|--------|---|--------|
|                                      | No Transformer   |   | Transformer-based |        | No Transformer Dual Inverter  |        |
| Frame Rating, kVA/kW                 | 15/13.5  | 20/18   | 15/13.5           | 20/18  | 15/13.5   | 20/18  |
| Battery Module                       |  |   |                   |        |   |        |
| Lead-Acid Batteries Per String       | 12   |   |                   |        |   |        |
| Battery Cells Per String             | 72   |   |                   |        |   |        |
| Battery Capacity                     | 36W @ 15min-rate to 1.67V per cell @25°C (77°F)  |   |                   |        |   |        |
| Backup Time, Full Load               | 5 minutes (for non-redundant system which has equal number of battery strings and power modules) |   |                   |        |   |        |
| Maximum Charge Current, (Full, Load) | Power Module Internal Charger: 1.8A  |   |                   |        |   |        |
|                                      | Charger Module: 10A  |   |                   |        |   |        |
| Nominal Voltage                      | 144VDC   |   |                   |        |   |        |
| Recharge Time                        | < 5 Hr.to 90% capacity (PM internal charger with 1:1 ratio of PM to Battery Strings)             |   |                   |        |   |        |
| Output Data                          |  |   |                   |        |   |        |
| Output Voltage, VAC                  | 200/208/220/230/240 Single-Phase   | 100/100/173/200<br>110/110/190/220<br>115/115/199/230<br>120/120/208/240 Single-Phase |                   |        | 200/100, 220/110, 230/115, 240/120, 254/127, 208/120, 173/100, 190/110, 200/115, 220/127; Two-Phase |        |
| Voltage Regulation                   | ±3%  |   |                   |        |   |        |
| Voltage Stability (100% Step Load)   | ±7%  |   |                   |        |   |        |
| Voltage Recovery Time                | ≤ 60 ms  |   |                   |        |   |        |
| Voltage Distortion                   | ≤ 3, linear load   |   |                   |        |   |        |
|                                      | ≤ 5%, non-linear load  | ≤ 7%, non-linear load   |                   |        | ≤ 5%, non-linear load   |        |
| Output Frequency                     | 50/60 Hz   |   |                   |        |   |        |
| Output Overload Capability           | < 104% continuous  |   |                   |        |   |        |
|                                      | 105% - 130% for 1 min  |   |                   |        |   |        |
|                                      | 131% - 150% for 10 sec   |   |                   |        |   |        |
|                                      | 151% - 200% for 1 sec  |   |                   |        |   |        |
|                                      | > 201% for 250 msec  |   |                   |        |   |        |



**Table 28 Rated input voltage range (Unit: VAC)**

| System Configuration  | % UPS Load | Low Limit Value               | High Limit Value |
|---|------------|-------------------------------|------------------|
| Dual-Inverter<br>Configured to 120<br>or 127 VAC per Phase      | >100%      | 98 $\pm$ 3.1                  | 139.5 $\pm$ 3.1  |
|   | 90% ~ 100% | 89 $\pm$ 3.1 ~ 98 $\pm$ 3.1   |                  |
|   | 70% ~ 90%  | 74 $\pm$ 3.1 ~ 89 $\pm$ 3.1   |                  |
|   | 30% ~ 70%  | 60.5 $\pm$ 3.1 ~ 74 $\pm$ 3.1 |                  |
|   | <30%       | 60.5 $\pm$ 3.1                |                  |
| Dual-Inverter<br>Configured to 100,<br>110 or 115 VAC per Phase | >100%      | 84 $\pm$ 3.1                  |                  |
|   | 90% ~ 100% | 80 $\pm$ 3.1 ~ 84 $\pm$ 3.1   |                  |
|   | 70%~90%    | 72 $\pm$ 3.1 ~ 80 $\pm$ 3.1   |                  |
|   | 40%~70%    | 60 $\pm$ 3.1 ~ 72 $\pm$ 3.1   |                  |
|   | <40%       | 60 $\pm$ 3.1                  |                  |
| Single-Inverter<br>Transformer-Based and<br>Transformer-Free    | > 100%     | 170 $\pm$ 5                   | 280 $\pm$ 5      |
|   | 90 ~ 100%  | 160 $\pm$ 5 ~ 170 $\pm$ 5     |                  |
|   | 70 ~ 90%   | 140 $\pm$ 5 ~ 160 $\pm$ 5     |                  |
|   | 50 ~ 70%   | 120 $\pm$ 5 ~ 140 $\pm$ 5     |                  |
|   | < 50%      | 120 $\pm$ 5                   |                  |

**Table 29 SolaHD S5KC external battery cabinet specifications**

| Parameters                        | SolaHD S5KC EBC  |
|-----------------------------------|--|
| <b>General and Environmental</b>  |  |
| Conducted and Radiated EMC Levels | IEC/EN/AS 62040-2—Class A, FCC Part 15 (Class A)                                     |
| Safety Standards                  | IEC/EN/AS 62040-1:2008, UL 1778 4th Ed and CSA 22.2 No. 107.3                        |
| Immunity Standards                | IEC/EN/AS 61000-4-2, 3, 4, 5, 6  |
| Transportation                    | ISTA-1E  |
| Dimensions, WxDxH                 | 17x28x38 in. (440x712x970mm)   |
| Unit Weight                       | 147.7 lb. (67kg)   |
| Shipping Weight                   | 209.4 lb. (95kg)   |
| <b>Environmental</b>              |  |
| Operating Temperature             | 32 to 104°F (0 to 40°C)  |
| Storage Temperature               | Without battery: -4 to 140°F (-20 to 60°C)<br>With battery: 5 to 104°F (-15 to 40°C) |
| Relative Humidity                 | 0 - 95%, non-condensing  |
| Altitude                          | 10,000 ft.(3000m)  |
| <b>Battery Module *</b>           |  |
| Lead-Acid Batteries (Per String)  | 12   |
| Backup Time (Full Load), Minutes  | See <b>Estimated Battery Run Times, 7.1 through 7.5</b>                              |

\* Up to four external battery cabinets can be connected to each UPS frame and each external battery cabinet can be configured with up to seven strings of batteries.



## 7.1 Estimated Battery Run Times

### 7.1.1 Tables for UPS Where Model Number Digits 1-4 are S5KA

**Table 30 10-bay, single-phase, no transformer unit Type N (& UPS model number digit 9 = N)**

| UPS Rating       | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  |     |
| 5 kVA / 4.5 kW   | 100%       | 5                 | 16  | 26  | 39  | 48  | 63  | 76  | 93  | 105 | 120 | 130 | 139 | 146 | 152 | 157 | 162 | 166 | 186 | 196 | 204 | 212 | 220 | 226 | 304 | 310 | 315 | 320 | 324 | 328 | 332 | 336 | 339 |     |
|                  | 90%        | 6                 | 18  | 30  | 44  | 52  | 72  | 90  | 104 | 120 | 131 | 140 | 148 | 154 | 160 | 165 | 184 | 195 | 204 | 213 | 221 | 300 | 307 | 313 | 318 | 323 | 328 | 332 | 336 | 340 | 343 | 346 | 422 |     |
|                  | 80%        | 8                 | 21  | 36  | 48  | 66  | 81  | 102 | 120 | 132 | 142 | 150 | 157 | 163 | 180 | 193 | 204 | 214 | 223 | 303 | 310 | 316 | 322 | 327 | 332 | 336 | 341 | 344 | 420 | 423 | 426 | 429 | 432 |     |
|                  | 70%        | 9                 | 25  | 42  | 53  | 77  | 100 | 120 | 134 | 144 | 153 | 160 | 166 | 191 | 204 | 215 | 225 | 305 | 313 | 320 | 326 | 332 | 337 | 341 | 346 | 421 | 425 | 428 | 432 | 434 | 437 | 440 | 442 |     |
|                  | 60%        | 11                | 28  | 48  | 71  | 96  | 113 | 135 | 147 | 156 | 164 | 187 | 202 | 215 | 226 | 308 | 317 | 324 | 331 | 337 | 342 | 347 | 423 | 427 | 431 | 434 | 437 | 440 | 443 | 445 | 448 | 450 | 452 |     |
|                  | 50%        | 15                | 38  | 60  | 90  | 112 | 136 | 150 | 160 | 181 | 200 | 216 | 301 | 312 | 321 | 329 | 336 | 343 | 420 | 425 | 430 | 434 | 438 | 441 | 444 | 447 | 450 | 452 | 454 | 456 | 458 | 460 | 462 |     |
|                  | 40%        | 19                | 47  | 78  | 110 | 138 | 154 | 165 | 197 | 216 | 304 | 316 | 327 | 336 | 344 | 422 | 428 | 433 | 438 | 442 | 446 | 449 | 452 | 455 | 457 | 460 | 462 | 464 | 466 | 467 | 480 | 480 | 480 |     |
|                  | 30%        | 27                | 66  | 108 | 142 | 160 | 192 | 217 | 309 | 324 | 336 | 345 | 426 | 432 | 438 | 444 | 448 | 452 | 456 | 459 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 20%        | 44                | 104 | 148 | 185 | 222 | 319 | 337 | 422 | 432 | 441 | 448 | 453 | 458 | 462 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | 99                | 166 | 312 | 345 | 437 | 450 | 459 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 100%             | -          | 5                 | 10  | 16  | 21  | 26  | 33  | 39  | 44  | 48  | 52  | 63  | 70  | 76  | 81  | 93  | 99  | 105 | 110 | 120 | 126 | 131 | 135 | 139 | 143 | 146 | 149 | 152 | 155 | 157 | 160 | 162 |     |     |
| 10 kVA / 9 kW    | 90%        | -                 | 6   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 103 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 165 | 167 | 183 |     |
|                  | 80%        | -                 | 8   | 14  | 21  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 102 | 108 | 120 | 126 | 132 | 138 | 142 | 146 | 150 | 154 | 157 | 160 | 163 | 165 | 180 | 187 | 193 | 199 | 204 |     |
|                  | 70%        | -                 | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 69  | 77  | 91  | 100 | 107 | 120 | 127 | 134 | 140 | 145 | 149 | 153 | 157 | 160 | 164 | 166 | 184 | 191 | 198 | 204 | 210 | 215 | 220 | 225 |     |
|                  | 60%        | -                 | 11  | 20  | 28  | 41  | 48  | 53  | 71  | 81  | 97  | 106 | 113 | 128 | 135 | 142 | 147 | 152 | 157 | 161 | 164 | 167 | 188 | 196 | 203 | 210 | 216 | 222 | 227 | 304 | 309 | 313 | 317 |     |
|                  | 50%        | -                 | 15  | 26  | 38  | 48  | 61  | 75  | 92  | 103 | 113 | 129 | 137 | 145 | 151 | 156 | 161 | 165 | 183 | 193 | 202 | 210 | 217 | 224 | 302 | 308 | 313 | 318 | 322 | 327 | 331 | 334 | 338 |     |
|                  | 40%        | -                 | 20  | 34  | 47  | 64  | 79  | 99  | 111 | 129 | 140 | 148 | 155 | 161 | 166 | 188 | 199 | 209 | 218 | 226 | 306 | 312 | 318 | 324 | 329 | 333 | 337 | 341 | 345 | 420 | 424 | 427 | 429 |     |
|                  | 30%        | -                 | 27  | 46  | 67  | 91  | 109 | 130 | 143 | 153 | 161 | 167 | 194 | 208 | 220 | 302 | 311 | 318 | 325 | 332 | 337 | 342 | 347 | 423 | 427 | 430 | 434 | 437 | 440 | 442 | 445 | 447 | 449 |     |
|                  | 20%        | -                 | 44  | 73  | 105 | 133 | 149 | 161 | 186 | 207 | 223 | 309 | 320 | 330 | 338 | 345 | 423 | 428 | 433 | 438 | 441 | 445 | 448 | 451 | 454 | 456 | 459 | 461 | 463 | 464 | 466 | 480 | 480 |     |
|                  | 10%        | -                 | 99  | 144 | 166 | 213 | 312 | 331 | 345 | 428 | 436 | 444 | 450 | 455 | 459 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 100%       | -                 | -   | 5   | 8   | 12  | 16  | 19  | 22  | 26  | 30  | 35  | 39  | 43  | 46  | 48  | 51  | 53  | 63  | 68  | 72  | 76  | 80  | 83  | 93  | 97  | 101 | 105 | 108 | 111 | 120 | 124 | -   |     |
| 15 kVA / 13.5 kW | 90%        | -                 | -   | 6   | 10  | 14  | 18  | 22  | 26  | 30  | 35  | 40  | 44  | 47  | 50  | 52  | 61  | 67  | 72  | 76  | 80  | 90  | 95  | 99  | 103 | 107 | 110 | 120 | 124 | 127 | 131 | 134 | -   |     |
|                  | 80%        | -                 | -   | 8   | 12  | 16  | 21  | 26  | 30  | 36  | 41  | 45  | 48  | 51  | 60  | 66  | 72  | 77  | 81  | 91  | 97  | 102 | 106 | 110 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | -   |     |
|                  | 70%        | -                 | -   | 9   | 14  | 19  | 25  | 30  | 37  | 42  | 46  | 50  | 53  | 65  | 72  | 77  | 82  | 94  | 100 | 105 | 109 | 120 | 125 | 129 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | -   |     |
|                  | 60%        | -                 | -   | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 52  | 64  | 71  | 78  | 83  | 97  | 103 | 109 | 113 | 125 | 131 | 135 | 140 | 144 | 147 | 151 | 154 | 157 | 159 | 162 | 164 | 166 | -   |     |
|                  | 50%        | -                 | -   | 15  | 22  | 28  | 38  | 45  | 50  | 61  | 71  | 79  | 92  | 100 | 107 | 113 | 126 | 132 | 137 | 142 | 147 | 151 | 155 | 158 | 161 | 164 | 166 | 183 | 190 | 196 | 202 | 208 | -   |     |
|                  | 40%        | -                 | -   | 20  | 28  | 40  | 47  | 53  | 69  | 79  | 94  | 104 | 111 | 126 | 133 | 140 | 145 | 151 | 155 | 159 | 163 | 166 | 184 | 192 | 199 | 206 | 213 | 219 | 224 | 301 | 306 | 310 | -   |     |
|                  | 30%        | -                 | -   | 27  | 41  | 50  | 67  | 80  | 98  | 109 | 125 | 135 | 143 | 150 | 156 | 161 | 165 | 184 | 194 | 204 | 212 | 220 | 227 | 305 | 311 | 316 | 321 | 325 | 330 | 334 | 337 | 341 | -   |     |
|                  | 20%        | -                 | -   | 44  | 63  | 81  | 105 | 125 | 139 | 149 | 157 | 164 | 186 | 200 | 212 | 223 | 304 | 313 | 320 | 326 | 332 | 337 | 342 | 347 | 423 | 426 | 430 | 433 | 436 | 439 | 441 | 444 | -   |     |
|                  | 10%        | -                 | -   | 98  | 132 | 152 | 165 | 201 | 222 | 311 | 324 | 335 | 344 | 424 | 430 | 436 | 441 | 445 | 449 | 453 | 456 | 459 | 461 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 31 10-bay, single-phase, no transformer unit Type R (&amp; UPS model number digit 9 = R)

| UPS Rating  | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|---|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|   |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  |     |
| 5 kVA/<br>4.5 kW  | 100%       | 5                 | 15  | 26  | 38  | 48  | 61  | 75  | 92  | 103 | 113 | 129 | 137 | 145 | 151 | 156 | 161 | 165 | 183 | 193 | 202 | 210 | 217 | 224 | 302 | 308 | 313 | 318 | 322 | 327 | 330 | 334 | 338 |     |
|   | 90%        | 6                 | 17  | 28  | 43  | 51  | 70  | 82  | 101 | 112 | 129 | 138 | 146 | 153 | 158 | 163 | 167 | 190 | 200 | 209 | 218 | 225 | 304 | 310 | 315 | 320 | 325 | 329 | 334 | 337 | 341 | 344 | 347 |     |
|   | 80%        | 7                 | 20  | 34  | 47  | 64  | 79  | 99  | 111 | 129 | 140 | 148 | 155 | 161 | 166 | 188 | 199 | 209 | 218 | 226 | 306 | 312 | 318 | 324 | 329 | 333 | 337 | 341 | 345 | 420 | 424 | 427 | 429 |     |
|   | 70%        | 9                 | 23  | 40  | 52  | 74  | 96  | 110 | 130 | 141 | 150 | 158 | 164 | 184 | 197 | 209 | 219 | 300 | 308 | 315 | 322 | 327 | 333 | 338 | 342 | 346 | 422 | 425 | 428 | 431 | 434 | 437 | 439 |     |
|   | 60%        | 11                | 27  | 46  | 67  | 91  | 109 | 131 | 143 | 153 | 161 | 167 | 195 | 208 | 220 | 302 | 311 | 319 | 326 | 332 | 337 | 343 | 347 | 423 | 427 | 431 | 434 | 437 | 440 | 442 | 445 | 447 | 449 |     |
|   | 50%        | 14                | 35  | 52  | 80  | 107 | 131 | 145 | 156 | 165 | 191 | 207 | 221 | 304 | 314 | 323 | 331 | 337 | 343 | 420 | 425 | 429 | 433 | 437 | 440 | 443 | 446 | 449 | 451 | 453 | 455 | 457 | 459 |     |
|   | 40%        | 18                | 44  | 72  | 104 | 132 | 148 | 160 | 184 | 205 | 222 | 307 | 319 | 328 | 337 | 344 | 422 | 427 | 432 | 437 | 441 | 444 | 447 | 450 | 453 | 456 | 458 | 460 | 462 | 464 | 466 | 467 | 480 |     |
|   | 30%        | 25                | 53  | 99  | 133 | 153 | 166 | 203 | 224 | 312 | 326 | 336 | 345 | 425 | 431 | 437 | 442 | 446 | 450 | 453 | 457 | 459 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA /9 kW  | 20%        | 39                | 92  | 138 | 161 | 203 | 303 | 323 | 338 | 422 | 431 | 439 | 445 | 451 | 455 | 459 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|   | 10%        | 78                | 154 | 216 | 327 | 422 | 438 | 449 | 457 | 464 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|   | 100%       | -                 | 5   | 10  | 15  | 20  | 26  | 32  | 39  | 44  | 48  | 52  | 62  | 69  | 75  | 81  | 92  | 99  | 104 | 109 | 113 | 125 | 130 | 134 | 138 | 142 | 145 | 149 | 151 | 154 | 157 | 159 | -   |     |
|   | 90%        | -                 | 6   | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 52  | 64  | 71  | 78  | 83  | 96  | 103 | 108 | 113 | 125 | 130 | 135 | 140 | 144 | 147 | 151 | 154 | 157 | 159 | 162 | 164 | 166 | -   |     |
|   | 80%        | -                 | 7   | 14  | 20  | 27  | 35  | 43  | 48  | 52  | 65  | 74  | 80  | 94  | 101 | 107 | 113 | 126 | 131 | 137 | 141 | 146 | 150 | 153 | 156 | 159 | 162 | 165 | 167 | 185 | 191 | 197 | -   |     |
|   | 70%        | -                 | 9   | 16  | 25  | 33  | 41  | 48  | 52  | 67  | 76  | 83  | 98  | 106 | 113 | 126 | 132 | 138 | 143 | 148 | 152 | 156 | 159 | 163 | 165 | 181 | 189 | 195 | 202 | 207 | 213 | 218 | -   |     |
|   | 60%        | -                 | 11  | 20  | 28  | 40  | 47  | 53  | 70  | 79  | 95  | 104 | 112 | 126 | 133 | 140 | 146 | 151 | 155 | 159 | 163 | 166 | 184 | 192 | 200 | 207 | 213 | 219 | 224 | 301 | 306 | 311 | -   |     |
|   | 50%        | -                 | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100 | 110 | 126 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 188 | 197 | 205 | 213 | 220 | 226 | 304 | 309 | 314 | 319 | 323 | 327 | 331 | -   |     |
| 15 kVA/<br>13.5 kW  | 40%        | -                 | 19  | 32  | 46  | 60  | 76  | 95  | 108 | 125 | 136 | 144 | 152 | 158 | 163 | 180 | 192 | 202 | 212 | 220 | 300 | 307 | 313 | 318 | 324 | 328 | 333 | 337 | 341 | 344 | 420 | 423 | -   |     |
|   | 30%        | -                 | 26  | 44  | 62  | 81  | 104 | 124 | 138 | 148 | 157 | 163 | 184 | 199 | 211 | 222 | 303 | 311 | 319 | 325 | 331 | 336 | 341 | 346 | 422 | 426 | 429 | 432 | 435 | 438 | 441 | 443 | -   |     |
|   | 20%        | -                 | 41  | 67  | 98  | 126 | 143 | 156 | 165 | 195 | 213 | 227 | 311 | 321 | 330 | 338 | 344 | 422 | 427 | 432 | 436 | 440 | 443 | 446 | 449 | 452 | 454 | 457 | 459 | 461 | 463 | 464 | -   |     |
|   | 10%        | -                 | 90  | 136 | 160 | 199 | 300 | 320 | 336 | 420 | 429 | 437 | 444 | 449 | 454 | 458 | 462 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |
|   | 100%       | -                 | -   | 5   | 8   | 12  | 16  | 19  | 22  | 26  | 30  | 35  | 39  | 42  | 46  | 48  | 51  | 53  | 62  | 67  | 72  | 76  | 79  | 83  | 93  | 97  | 101 | 104 | 108 | 111 | 120 | 123 | -   |     |
|   | 90%        | -                 | -   | 6   | 10  | 13  | 18  | 21  | 26  | 28  | 35  | 39  | 43  | 46  | 49  | 52  | 60  | 66  | 71  | 75  | 79  | 83  | 94  | 98  | 102 | 106 | 110 | 113 | 123 | 127 | 130 | 133 | -   |     |
|   | 80%        | -                 | -   | 7   | 11  | 16  | 20  | 25  | 28  | 35  | 40  | 44  | 48  | 51  | 53  | 65  | 71  | 76  | 80  | 90  | 96  | 101 | 105 | 109 | 113 | 123 | 127 | 131 | 135 | 138 | 141 | 144 | -   |     |
|   | 70%        | -                 | -   | 9   | 14  | 19  | 25  | 28  | 36  | 41  | 46  | 49  | 52  | 64  | 71  | 76  | 81  | 93  | 98  | 104 | 108 | 113 | 123 | 128 | 132 | 136 | 140 | 143 | 147 | 149 | 152 | 155 | -   |     |
| Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading. | 60%        | -                 | -   | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 51  | 62  | 70  | 77  | 82  | 95  | 102 | 107 | 112 | 124 | 129 | 134 | 138 | 142 | 146 | 150 | 153 | 156 | 158 | 161 | 163 | 165 | -   |     |
|   | 50%        | -                 | -   | 15  | 22  | 28  | 38  | 44  | 50  | 60  | 69  | 77  | 90  | 98  | 105 | 111 | 124 | 130 | 136 | 141 | 145 | 149 | 153 | 156 | 160 | 162 | 165 | 180 | 187 | 193 | 199 | 205 | -   |     |
|   | 40%        | -                 | -   | 19  | 27  | 38  | 46  | 52  | 67  | 77  | 92  | 101 | 109 | 123 | 131 | 137 | 143 | 148 | 153 | 157 | 161 | 164 | 167 | 187 | 195 | 202 | 209 | 215 | 220 | 226 | 302 | 307 | -   |     |
|   | 30%        | -                 | -   | 27  | 40  | 49  | 64  | 77  | 94  | 106 | 122 | 132 | 140 | 147 | 153 | 158 | 163 | 167 | 188 | 198 | 207 | 215 | 222 | 300 | 306 | 312 | 317 | 321 | 326 | 330 | 334 | 337 | -   |     |
|   | 20%        | -                 | -   | 42  | 53  | 78  | 100 | 120 | 134 | 145 | 154 | 161 | 167 | 192 | 205 | 216 | 226 | 306 | 314 | 321 | 327 | 332 | 337 | 342 | 346 | 422 | 426 | 429 | 432 | 435 | 438 | 440 | -   |     |
|   | 10%        | -                 | -   | 91  | 125 | 146 | 161 | 189 | 212 | 302 | 316 | 327 | 337 | 345 | 424 | 430 | 436 | 440 | 445 | 448 | 452 | 455 | 457 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | -   |     |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 32 10-bay, single-phase, no transformer unit Type F (&amp; UPS model number digit 9 = F)

| UPS Rating     | Load Level | # Battery Strings |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------------|------------|-------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                |            | 1                 | 2  | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  |     |
| 5 kVA / 4.5 kW | 100%       | -                 | 5  | 15  | 26  | 38  | 48  | 61  | 75  | 92  | 103 | 113 | 129 | 137 | 145 | 151 | 156 | 161 | 165 | 183 | 193 | 202 | 210 | 217 | 224 | 302 | 308 | 313 | 318 | 322 | 327 | 330 | 334 |     |
|                | 90%        | -                 | 6  | 17  | 28  | 43  | 51  | 70  | 82  | 101 | 112 | 129 | 138 | 146 | 153 | 158 | 163 | 167 | 190 | 200 | 209 | 218 | 225 | 304 | 310 | 315 | 320 | 325 | 329 | 334 | 337 | 341 | 344 |     |
|                | 80%        | -                 | 7  | 20  | 34  | 47  | 64  | 79  | 99  | 111 | 129 | 140 | 148 | 155 | 161 | 166 | 188 | 199 | 209 | 218 | 226 | 306 | 312 | 318 | 324 | 329 | 333 | 337 | 341 | 345 | 420 | 424 | 427 |     |
|                | 70%        | -                 | 9  | 23  | 40  | 52  | 74  | 96  | 110 | 130 | 141 | 150 | 158 | 164 | 184 | 197 | 209 | 219 | 300 | 308 | 315 | 322 | 327 | 333 | 338 | 342 | 346 | 422 | 425 | 428 | 431 | 434 | 437 |     |
|                | 60%        | -                 | 11 | 27  | 46  | 67  | 91  | 109 | 131 | 143 | 153 | 161 | 167 | 195 | 208 | 220 | 302 | 311 | 319 | 326 | 332 | 337 | 343 | 347 | 423 | 427 | 431 | 434 | 437 | 440 | 442 | 445 | 447 |     |
|                | 50%        | -                 | 14 | 35  | 52  | 80  | 107 | 131 | 145 | 156 | 165 | 165 | 191 | 207 | 221 | 304 | 314 | 323 | 331 | 337 | 343 | 420 | 425 | 429 | 433 | 437 | 440 | 443 | 446 | 449 | 451 | 453 | 455 | 457 |
|                | 40%        | -                 | 18 | 44  | 72  | 104 | 132 | 148 | 160 | 184 | 205 | 222 | 307 | 319 | 328 | 337 | 344 | 422 | 427 | 432 | 437 | 441 | 444 | 447 | 450 | 453 | 456 | 458 | 460 | 462 | 464 | 466 | 467 |     |
|                | 30%        | -                 | 25 | 53  | 99  | 133 | 153 | 166 | 203 | 224 | 312 | 326 | 336 | 345 | 425 | 431 | 437 | 442 | 446 | 450 | 453 | 457 | 459 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA / 9 kW  | 20%        | -                 | 39 | 92  | 138 | 161 | 203 | 303 | 323 | 338 | 422 | 431 | 439 | 445 | 451 | 455 | 459 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                | 10%        | -                 | 78 | 154 | 216 | 327 | 422 | 438 | 449 | 457 | 464 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                | 100%       | -                 | -  | 5   | 10  | 15  | 20  | 26  | 32  | 39  | 44  | 48  | 52  | 62  | 69  | 75  | 81  | 92  | 99  | 104 | 109 | 113 | 125 | 130 | 134 | 138 | 142 | 145 | 149 | 151 | 154 | 157 | -   |     |
|                | 90%        | -                 | -  | 6   | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 52  | 64  | 71  | 78  | 83  | 96  | 103 | 108 | 113 | 125 | 130 | 135 | 140 | 144 | 147 | 151 | 154 | 157 | 159 | 162 | 164 | -   |     |
|                | 80%        | -                 | -  | 7   | 14  | 20  | 27  | 35  | 43  | 48  | 52  | 65  | 74  | 80  | 94  | 101 | 107 | 113 | 126 | 131 | 137 | 141 | 146 | 150 | 153 | 156 | 159 | 162 | 165 | 167 | 185 | 191 | -   |     |
|                | 70%        | -                 | -  | 9   | 16  | 25  | 33  | 41  | 48  | 52  | 67  | 76  | 83  | 98  | 106 | 113 | 126 | 132 | 138 | 143 | 148 | 152 | 156 | 159 | 163 | 165 | 181 | 189 | 195 | 202 | 207 | 213 | -   |     |
|                | 60%        | -                 | -  | 11  | 20  | 28  | 40  | 47  | 53  | 70  | 79  | 95  | 104 | 112 | 126 | 133 | 140 | 146 | 151 | 155 | 159 | 163 | 166 | 184 | 192 | 200 | 207 | 213 | 219 | 224 | 301 | 306 | -   |     |
|                | 50%        | -                 | -  | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100 | 110 | 126 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 188 | 197 | 205 | 213 | 220 | 226 | 304 | 309 | 314 | 319 | 323 | 327 | -   |     |
|                | 40%        | -                 | -  | 19  | 32  | 46  | 60  | 76  | 95  | 108 | 125 | 136 | 144 | 152 | 158 | 163 | 180 | 192 | 202 | 212 | 220 | 300 | 307 | 313 | 318 | 324 | 328 | 333 | 337 | 341 | 344 | 420 | -   |     |
|                | 30%        | -                 | -  | 26  | 44  | 62  | 81  | 104 | 124 | 138 | 148 | 157 | 163 | 184 | 199 | 211 | 222 | 303 | 311 | 319 | 325 | 331 | 336 | 341 | 346 | 422 | 426 | 429 | 432 | 435 | 438 | 441 | -   |     |
|                | 20%        | -                 | -  | 41  | 67  | 98  | 126 | 143 | 156 | 165 | 195 | 213 | 227 | 311 | 321 | 330 | 338 | 344 | 422 | 427 | 432 | 436 | 440 | 443 | 446 | 449 | 452 | 454 | 457 | 459 | 461 | 463 | -   |     |
|                | 10%        | -                 | -  | 90  | 136 | 160 | 199 | 300 | 320 | 336 | 420 | 429 | 437 | 444 | 449 | 454 | 458 | 462 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |     |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



## 7.2 Estimated Battery Run Times

### 7.2.1 Tables for UPS Model Number Where Digits 1-4 are S5KB

**Table 33 16-bay, single-phase, no transformer unit Type N (& UPS model number digit 9 = N)**

| UPS Rating      | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                 |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  |     |     |
| 5kVA / 4.5kW    | 100%       | 5                 | 16  | 26  | 39  | 48  | 63  | 76  | 93  | 105 | 120 | 130 | 139 | 146 | 152 | 157 | 162 | 166 | 186 | 196 | 205 | 213 | 220 | 226 | 230 | 234 | 238 | 242 | 246 | 250 | 254 | 258 | 262 | 266 | 270 | 274 | 278 | 282 |
|                 | 90%        | 6                 | 18  | 30  | 44  | 52  | 72  | 90  | 103 | 120 | 131 | 140 | 148 | 154 | 160 | 165 | 183 | 194 | 204 | 213 | 221 | 300 | 307 | 313 | 318 | 323 | 328 | 332 | 336 | 340 | 343 | 346 | 349 | 352 | 355 | 358 | 361 | 364 |
|                 | 80%        | 8                 | 21  | 36  | 48  | 66  | 81  | 102 | 120 | 132 | 142 | 150 | 157 | 163 | 180 | 193 | 204 | 214 | 222 | 302 | 309 | 316 | 321 | 327 | 332 | 336 | 340 | 344 | 348 | 352 | 356 | 360 | 364 | 368 | 372 | 376 | 380 | 384 |
|                 | 70%        | 9                 | 25  | 42  | 53  | 77  | 99  | 113 | 133 | 144 | 153 | 160 | 166 | 190 | 203 | 214 | 224 | 305 | 312 | 319 | 325 | 331 | 336 | 341 | 345 | 349 | 353 | 357 | 361 | 365 | 369 | 373 | 377 | 381 | 385 | 389 | 393 | 397 |
|                 | 60%        | 11                | 28  | 48  | 70  | 95  | 112 | 134 | 146 | 156 | 163 | 186 | 201 | 215 | 226 | 307 | 316 | 323 | 330 | 336 | 341 | 346 | 351 | 356 | 361 | 366 | 371 | 376 | 381 | 386 | 391 | 396 | 401 | 406 | 411 | 416 | 421 |     |
|                 | 50%        | 15                | 38  | 60  | 90  | 111 | 136 | 149 | 160 | 180 | 199 | 215 | 300 | 311 | 320 | 329 | 336 | 342 | 420 | 425 | 429 | 433 | 437 | 441 | 444 | 447 | 449 | 452 | 454 | 456 | 458 | 460 | 462 | 463 | 465 | 466 | 468 |     |
|                 | 40%        | 19                | 46  | 77  | 109 | 137 | 153 | 164 | 195 | 215 | 302 | 315 | 326 | 335 | 343 | 421 | 427 | 432 | 437 | 441 | 445 | 448 | 451 | 454 | 457 | 459 | 461 | 463 | 465 | 467 | 468 | 480 | 480 | 480 | 480 | 480 |     |     |
|                 | 30%        | 27                | 64  | 106 | 140 | 159 | 189 | 215 | 307 | 322 | 334 | 344 | 424 | 431 | 437 | 443 | 447 | 451 | 455 | 458 | 461 | 463 | 466 | 468 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                 | 20%        | 43                | 102 | 147 | 180 | 219 | 316 | 334 | 420 | 431 | 439 | 446 | 452 | 457 | 461 | 465 | 469 | 473 | 477 | 481 | 484 | 488 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                 | 10%        | 96                | 164 | 308 | 342 | 434 | 448 | 457 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
| 10kVA /9kW      | 100%       | -                 | 5   | 10  | 16  | 21  | 26  | 33  | 39  | 44  | 49  | 52  | 63  | 70  | 76  | 82  | 94  | 100 | 105 | 110 | 121 | 126 | 131 | 135 | 139 | 143 | 146 | 149 | 152 | 155 | 158 | 160 | 162 | 164 | 166 | 181 |     |     |
|                 | 90%        | -                 | 6   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 104 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 165 | 167 | 184 | 189 | 195 | 200 |     |     |
|                 | 80%        | -                 | 8   | 14  | 21  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 95  | 102 | 108 | 120 | 127 | 132 | 138 | 142 | 147 | 150 | 154 | 157 | 160 | 163 | 165 | 180 | 187 | 193 | 199 | 204 | 209 | 214 | 219 |     |     |
|                 | 70%        | -                 | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 69  | 77  | 91  | 100 | 107 | 120 | 127 | 134 | 140 | 145 | 149 | 153 | 157 | 161 | 164 | 166 | 184 | 191 | 198 | 204 | 210 | 215 | 220 | 225 | 302 | 306 | 310 |     |     |
|                 | 60%        | -                 | 12  | 21  | 30  | 41  | 48  | 60  | 72  | 81  | 97  | 106 | 120 | 128 | 136 | 142 | 148 | 152 | 157 | 161 | 164 | 180 | 188 | 196 | 204 | 210 | 217 | 222 | 300 | 305 | 309 | 314 | 318 | 321 | 325 | 328 |     |     |
|                 | 50%        | -                 | 15  | 26  | 38  | 48  | 61  | 75  | 92  | 103 | 113 | 129 | 137 | 145 | 151 | 156 | 161 | 165 | 183 | 193 | 202 | 210 | 217 | 224 | 302 | 308 | 313 | 318 | 322 | 327 | 331 | 334 | 338 | 341 | 344 | 347 |     |     |
|                 | 40%        | -                 | 20  | 34  | 47  | 64  | 79  | 99  | 111 | 129 | 140 | 148 | 155 | 161 | 166 | 188 | 199 | 209 | 218 | 226 | 306 | 312 | 318 | 324 | 329 | 333 | 337 | 341 | 345 | 349 | 353 | 357 | 361 | 365 | 369 | 373 |     |     |
|                 | 30%        | -                 | 27  | 46  | 67  | 91  | 109 | 130 | 143 | 153 | 160 | 167 | 194 | 208 | 219 | 301 | 310 | 318 | 325 | 331 | 337 | 342 | 347 | 352 | 357 | 362 | 367 | 372 | 377 | 382 | 387 | 392 | 397 | 402 | 407 | 412 |     |     |
|                 | 20%        | -                 | 44  | 73  | 105 | 132 | 149 | 161 | 186 | 206 | 223 | 308 | 320 | 329 | 337 | 344 | 423 | 428 | 433 | 437 | 441 | 445 | 448 | 451 | 454 | 456 | 458 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 |     |     |
|                 | 10%        | -                 | 98  | 143 | 165 | 213 | 311 | 330 | 344 | 427 | 436 | 443 | 449 | 454 | 459 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
| 15kVA / 13.5 kW | 100%       | -                 | -   | 5   | 8   | 12  | 16  | 19  | 22  | 26  | 30  | 35  | 39  | 43  | 46  | 48  | 51  | 53  | 63  | 68  | 72  | 76  | 80  | 83  | 93  | 98  | 101 | 105 | 108 | 111 | 120 | 124 | 127 | 131 | 134 | -   |     |     |
|                 | 90%        | -                 | -   | 6   | 10  | 14  | 18  | 22  | 26  | 30  | 35  | 40  | 44  | 47  | 50  | 52  | 61  | 67  | 72  | 76  | 80  | 90  | 95  | 99  | 103 | 107 | 111 | 120 | 124 | 128 | 131 | 134 | 137 | 140 | 143 | -   |     |     |
|                 | 80%        | -                 | -   | 8   | 12  | 16  | 21  | 26  | 30  | 36  | 41  | 45  | 48  | 51  | 60  | 66  | 72  | 77  | 81  | 92  | 97  | 102 | 106 | 110 | 120 | 124 | 129 | 132 | 136 | 139 | 142 | 145 | 148 | 150 | 153 | -   |     |     |
|                 | 70%        | -                 | -   | 9   | 14  | 19  | 25  | 30  | 37  | 42  | 46  | 50  | 53  | 65  | 72  | 77  | 82  | 94  | 100 | 105 | 110 | 120 | 125 | 130 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | 158 | 161 | 163 | -   |     |     |
|                 | 60%        | -                 | -   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 103 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 164 | 167 | 183 | 189 | 194 | -   |     |     |
|                 | 50%        | -                 | -   | 15  | 22  | 28  | 39  | 45  | 50  | 62  | 71  | 79  | 92  | 100 | 107 | 113 | 126 | 132 | 138 | 143 | 147 | 151 | 155 | 158 | 161 | 164 | 167 | 184 | 190 | 197 | 203 | 208 | 213 | 218 | 222 | -   |     |     |
|                 | 40%        | -                 | -   | 20  | 28  | 40  | 47  | 53  | 70  | 79  | 94  | 104 | 112 | 126 | 133 | 140 | 146 | 151 | 155 | 159 | 163 | 166 | 184 | 192 | 200 | 207 | 213 | 219 | 224 | 301 | 306 | 311 | 315 | 319 | 322 | -   |     |     |
|                 | 30%        | -                 | -   | 27  | 41  | 50  | 67  | 80  | 98  | 109 | 125 | 135 | 143 | 150 | 156 | 161 | 165 | 184 | 195 | 204 | 212 | 220 | 227 | 305 | 311 | 316 | 321 | 326 | 330 | 334 | 337 | 341 | 344 | 347 | 422 | -   |     |     |
|                 | 20%        | -                 | -   | 44  | 63  | 82  | 105 | 126 | 139 | 149 | 158 | 164 | 187 | 201 | 213 | 224 | 305 | 313 | 320 | 327 | 333 | 338 | 343 | 347 | 423 | 427 | 430 | 433 | 436 | 439 | 442 | 444 | 446 | 448 | 450 | -   |     |     |
|                 | 10%        | -                 | -   | 99  | 133 | 152 | 166 | 202 | 223 | 312 | 325 | 336 | 345 | 424 | 431 | 436 | 441 | 446 | 450 | 453 | 456 | 459 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |     |
| 20kVA / 18kW    | 100%       | -                 | -   | -   | 5   | 8   | 10  | 13  | 16  | 18  | 21  | 23  | 26  | 28  | 32  | 36  | 39  | 42  | 44  | 46  | 48  | 50  | 52  | 53  | 62  | 66  | 69  | 73  | 76  | 78  | 81  | 83  | 93  | 96  | 99  | -   |     |     |
|                 | 90%        | -                 | -   | -   | 6   | 9   | 11  | 14  | 18  | 20  | 23  | 26  | 28  | 34  | 37  | 41  | 43  | 46  | 48  | 50  | 52  | 54  | 64  | 68  | 71  | 75  | 78  | 81  | 83  | 93  | 97  | 100 | 103 | 106 | 109 | -   |     |     |
|                 | 80%        | -                 | -   | -   | 8   | 11  | 14  | 18  | 21  | 25  | 27  | 31  | 36  | 40  | 43  | 46  | 48  | 50  | 52  | 61  | 66  | 70  | 74  | 78  | 81  | 90  | 94  | 98  | 102 | 105 | 108 | 111 | 120 | 123 | 126 | -   |     |     |
|                 | 70%        | -                 | -   | -   | 9   | 13  | 17  | 21  | 25  | 28  | 33  | 38  | 42  | 45  | 48  | 51  | 53  | 64  | 69  | 73  | 77  | 81  | 91  | 96  | 100 | 104 | 107 | 111 | 120 | 124 | 127 | 131 | 134 | 137 | 140 | -   |     |     |
|                 | 60%        | -                 | -   | -   | 12  | 16  | 21  | 26  | 30  | 36  | 41  | 45  | 48  | 51  | 60  | 66  | 72  | 77  | 81  | 92  | 97  | 102 | 106 | 110 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | 148 | 150 | 153 | -   |     |     |
|                 | 50%        | -                 | -   | -   | 15  | 20  | 26  | 32  | 39  | 44  | 48  | 51  | 62  | 69  | 75  | 81  | 92  | 98  | 104 | 109 | 113 | 124 | 129 | 134 | 138 | 142 | 145 | 148 | 151 | 154 | 157 | 159 | 161 | 163 | 165 | -   |     |     |
|                 | 40%        | -                 | -   | -   | 20  | 27  | 35  | 42  | 47  | 52  | 64  | 72  | 79  | 92  | 100 | 106 | 112 | 124 | 130 | 135 | 140 | 144 | 148 | 152 | 155 | 158 | 161 | 164 | 166 | 182 | 189 | 195 | 200 | 205 | 210 | -   |     |     |
|                 | 30%        | -                 | -   | -   | 27  | 39  | 46  | 52  | 67  | 77  | 92  | 101 | 109 | 123 | 131 | 138 | 143 | 149 | 153 | 157 | 161 | 164 | 167 | 188 | 195 | 202 | 209 | 215 | 221 | 226 | 303 | 307 | 311 | 315 | 319 | -   |     |     |
|                 | 20%        | -                 | -   | -   | 45  | 53  | 74  | 92  | 105 | 122 | 133 | 142 | 150 | 156 | 161 | 166 | 187 | 198 | 208 | 217 | 224 | 303 | 31  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 34 16-bay, single-phase, no transformer unit Type R (&amp; UPS model number digit 9 = R)

| UPS Rating         | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|--------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                    |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  |     |
| 5 kVA/<br>4.5 kW   | 100%       | 5                 | 15  | 26  | 38  | 48  | 61  | 75  | 92  | 103 | 113 | 129 | 137 | 145 | 151 | 156 | 161 | 165 | 183 | 193 | 202 | 210 | 218 | 224 | 302 | 308 | 313 | 318 | 323 | 327 | 331 | 334 | 338 | 341 | 344 | 347 |     |
|                    | 90%        | 6                 | 17  | 28  | 43  | 51  | 70  | 82  | 101 | 112 | 129 | 138 | 146 | 152 | 158 | 163 | 167 | 190 | 200 | 209 | 217 | 225 | 303 | 309 | 315 | 320 | 325 | 329 | 333 | 337 | 341 | 344 | 347 | 422 | 425 | 427 |     |
|                    | 80%        | 7                 | 20  | 34  | 47  | 63  | 79  | 99  | 111 | 129 | 139 | 148 | 155 | 161 | 166 | 187 | 199 | 209 | 218 | 226 | 305 | 312 | 318 | 323 | 328 | 333 | 337 | 341 | 345 | 420 | 423 | 426 | 429 | 432 | 434 | 437 |     |
|                    | 70%        | 9                 | 23  | 40  | 52  | 74  | 96  | 111 | 130 | 141 | 150 | 158 | 164 | 184 | 198 | 209 | 219 | 300 | 308 | 315 | 322 | 328 | 333 | 338 | 342 | 346 | 422 | 425 | 429 | 432 | 434 | 437 | 439 | 442 | 444 | 446 |     |
|                    | 60%        | 11                | 28  | 46  | 68  | 92  | 110 | 131 | 144 | 153 | 161 | 180 | 196 | 209 | 221 | 303 | 312 | 319 | 326 | 332 | 338 | 343 | 420 | 424 | 428 | 431 | 434 | 437 | 440 | 443 | 445 | 447 | 450 | 452 | 453 | 455 |     |
|                    | 50%        | 14                | 36  | 52  | 81  | 108 | 132 | 146 | 157 | 165 | 192 | 208 | 222 | 305 | 315 | 324 | 331 | 338 | 344 | 421 | 426 | 430 | 434 | 437 | 441 | 444 | 446 | 449 | 451 | 454 | 456 | 458 | 459 | 461 | 463 | 464 |     |
|                    | 40%        | 18                | 44  | 73  | 104 | 132 | 149 | 161 | 185 | 206 | 222 | 308 | 319 | 329 | 337 | 344 | 422 | 428 | 433 | 437 | 441 | 445 | 448 | 451 | 453 | 456 | 458 | 460 | 462 | 464 | 466 | 467 | 480 | 480 | 480 | 480 |     |
|                    | 30%        | 25                | 53  | 99  | 133 | 153 | 166 | 202 | 223 | 312 | 325 | 336 | 345 | 424 | 431 | 437 | 441 | 446 | 450 | 453 | 456 | 459 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                    | 20%        | 38                | 90  | 136 | 160 | 199 | 300 | 320 | 336 | 420 | 429 | 437 | 444 | 449 | 454 | 458 | 462 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                    | 10%        | 73                | 149 | 207 | 320 | 345 | 433 | 445 | 454 | 461 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA/<br>9 kW    | 100%       | -                 | 5   | 10  | 16  | 21  | 26  | 32  | 39  | 44  | 48  | 52  | 62  | 69  | 76  | 81  | 93  | 99  | 104 | 109 | 120 | 125 | 130 | 134 | 138 | 142 | 145 | 149 | 152 | 154 | 157 | 159 | 162 | 164 | 166 | -   |     |
|                    | 90%        | -                 | 6   | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 52  | 64  | 71  | 78  | 83  | 97  | 103 | 108 | 113 | 125 | 131 | 135 | 140 | 144 | 147 | 151 | 154 | 157 | 159 | 162 | 164 | 166 | 182 | 188 | 193 | -   |     |
|                    | 80%        | -                 | 7   | 14  | 20  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 101 | 108 | 113 | 126 | 132 | 137 | 142 | 146 | 150 | 153 | 157 | 160 | 162 | 165 | 167 | 185 | 192 | 203 | 208 | 213 | -   |     |     |
|                    | 70%        | -                 | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 68  | 76  | 90  | 99  | 106 | 113 | 126 | 133 | 138 | 144 | 148 | 152 | 156 | 160 | 163 | 166 | 182 | 189 | 196 | 202 | 208 | 213 | 218 | 223 | 300 | 304 | -   |     |
|                    | 60%        | -                 | 11  | 20  | 28  | 40  | 47  | 53  | 70  | 79  | 95  | 104 | 112 | 126 | 133 | 140 | 146 | 151 | 155 | 159 | 163 | 166 | 184 | 192 | 200 | 207 | 213 | 219 | 224 | 302 | 306 | 311 | 315 | 319 | 322 | -   |     |
|                    | 50%        | -                 | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100 | 110 | 126 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 187 | 197 | 205 | 213 | 219 | 226 | 304 | 309 | 314 | 319 | 323 | 327 | 331 | 334 | 338 | 341 | -   |     |
|                    | 40%        | -                 | 19  | 32  | 46  | 60  | 76  | 95  | 108 | 125 | 136 | 144 | 152 | 158 | 163 | 180 | 192 | 202 | 212 | 220 | 300 | 306 | 313 | 318 | 324 | 328 | 333 | 337 | 341 | 344 | 420 | 423 | 426 | 428 | 431 | -   |     |
|                    | 30%        | -                 | 26  | 44  | 62  | 80  | 104 | 124 | 138 | 148 | 156 | 163 | 184 | 198 | 211 | 221 | 303 | 311 | 318 | 325 | 331 | 336 | 341 | 346 | 422 | 425 | 429 | 432 | 435 | 438 | 440 | 443 | 445 | 447 | 449 | -   |     |
|                    | 20%        | -                 | 41  | 67  | 98  | 125 | 143 | 156 | 165 | 194 | 212 | 227 | 311 | 321 | 330 | 337 | 344 | 422 | 427 | 432 | 436 | 440 | 443 | 446 | 449 | 452 | 454 | 456 | 459 | 461 | 462 | 464 | 466 | 467 | 480 | -   |     |
|                    | 10%        | -                 | 83  | 135 | 159 | 199 | 227 | 320 | 335 | 347 | 429 | 437 | 443 | 449 | 454 | 458 | 461 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 15 kVA/<br>13.5 kW | 100%       | -                 | -   | 5   | 8   | 12  | 16  | 19  | 22  | 26  | 30  | 35  | 39  | 43  | 46  | 48  | 51  | 53  | 63  | 67  | 72  | 76  | 79  | 83  | 93  | 97  | 101 | 105 | 108 | 111 | 120 | 124 | 127 | 130 | 133 | -   |     |
|                    | 90%        | -                 | -   | 6   | 10  | 14  | 18  | 21  | 26  | 28  | 35  | 40  | 43  | 47  | 49  | 52  | 61  | 66  | 71  | 76  | 80  | 83  | 94  | 99  | 103 | 107 | 110 | 113 | 123 | 127 | 130 | 134 | 137 | 140 | 142 | -   |     |
|                    | 80%        | -                 | -   | 7   | 11  | 16  | 20  | 25  | 28  | 35  | 40  | 45  | 48  | 51  | 53  | 65  | 71  | 76  | 80  | 91  | 96  | 101 | 105 | 109 | 113 | 123 | 128 | 131 | 135 | 138 | 141 | 144 | 147 | 150 | 152 | -   |     |
|                    | 70%        | -                 | -   | 9   | 14  | 19  | 25  | 28  | 36  | 42  | 46  | 50  | 53  | 64  | 71  | 77  | 81  | 93  | 99  | 104 | 109 | 113 | 124 | 129 | 133 | 137 | 140 | 144 | 147 | 150 | 153 | 155 | 157 | 160 | 162 | -   |     |
|                    | 60%        | -                 | -   | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 51  | 63  | 70  | 77  | 83  | 95  | 102 | 107 | 112 | 124 | 129 | 134 | 139 | 143 | 146 | 150 | 153 | 156 | 159 | 161 | 163 | 166 | 180 | 186 | 191 | -   |     |
|                    | 50%        | -                 | -   | 15  | 22  | 28  | 38  | 45  | 50  | 60  | 69  | 77  | 90  | 98  | 105 | 111 | 124 | 130 | 136 | 141 | 145 | 150 | 153 | 157 | 160 | 163 | 165 | 180 | 187 | 193 | 199 | 205 | 210 | 215 | 220 | -   |     |
|                    | 40%        | -                 | -   | 19  | 27  | 39  | 46  | 52  | 67  | 77  | 92  | 101 | 109 | 123 | 131 | 138 | 143 | 149 | 153 | 157 | 161 | 164 | 167 | 188 | 195 | 203 | 209 | 215 | 221 | 226 | 303 | 307 | 311 | 315 | 319 | -   |     |
|                    | 30%        | -                 | -   | 27  | 40  | 49  | 64  | 77  | 95  | 106 | 122 | 132 | 140 | 147 | 153 | 158 | 163 | 167 | 189 | 198 | 207 | 215 | 222 | 300 | 306 | 312 | 317 | 322 | 326 | 330 | 334 | 337 | 341 | 344 | 347 | -   |     |
|                    | 20%        | -                 | -   | 42  | 53  | 78  | 101 | 121 | 135 | 145 | 154 | 161 | 167 | 193 | 205 | 216 | 226 | 307 | 314 | 321 | 327 | 333 | 338 | 342 | 347 | 422 | 426 | 429 | 432 | 435 | 438 | 440 | 443 | 445 | 447 | -   |     |
|                    | 10%        | -                 | -   | 92  | 126 | 147 | 161 | 190 | 213 | 302 | 316 | 328 | 338 | 346 | 425 | 431 | 436 | 441 | 445 | 449 | 452 | 455 | 458 | 460 | 463 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |
| 20 kVA/<br>18 kW   | 100%       | -                 | -   | -   | 5   | 8   | 10  | 13  | 16  | 18  | 21  | 23  | 26  | 28  | 32  | 36  | 39  | 42  | 44  | 46  | 48  | 50  | 52  | 53  | 62  | 66  | 69  | 73  | 76  | 78  | 81  | 83  | 93  | 96  | -   | -   |     |
|                    | 90%        | -                 | -   | -   | 6   | 9   | 11  | 14  | 18  | 20  | 23  | 26  | 28  | 34  | 37  | 41  | 43  | 46  | 48  | 50  | 52  | 53  | 63  | 67  | 71  | 75  | 78  | 81  | 83  | 93  | 96  | 100 | 103 | 105 | -   | -   |     |
|                    | 80%        | -                 | -   | -   | 7   | 10  | 14  | 17  | 20  | 23  | 27  | 31  | 35  | 39  | 43  | 45  | 48  | 50  | 52  | 61  | 65  | 70  | 74  | 77  | 80  | 83  | 93  | 97  | 101 | 104 | 107 | 110 | 113 | 122 | -   | -   |     |
|                    | 70%        | -                 | -   | -   | 9   | 13  | 17  | 20  | 25  | 28  | 33  | 38  | 42  | 45  | 48  | 50  | 53  | 62  | 68  | 72  | 76  | 80  | 90  | 94  | 99  | 103 | 106 | 110 | 113 | 122 | 126 | 129 | 133 | 136 | -   | -   |     |
|                    | 60%        | -                 | -   | -   | 11  | 16  | 20  | 25  | 28  | 35  | 40  | 44  | 48  | 51  | 53  | 65  | 70  | 75  | 80  | 90  | 95  | 100 | 104 | 109 | 112 | 122 | 127 | 130 | 134 | 137 | 141 | 143 | 146 | 149 | -   | -   |     |
|                    | 50%        | -                 | -   | -   | 15  | 20  | 26  | 31  | 38  | 43  | 47  | 51  | 60  | 67  | 73  | 79  | 90  | 96  | 102 | 107 | 111 | 122 | 127 | 131 | 136 | 139 | 143 | 146 | 149 | 152 | 155 | 157 | 160 | 162 | -   | -   |     |
|                    | 40%        | -                 | -   | -   | 19  | 26  | 33  | 41  | 46  | 51  | 62  | 70  | 77  | 83  | 97  | 104 | 109 | 121 | 127 | 133 | 138 | 142 | 146 | 150 | 153 | 156 | 159 | 162 | 164 | 167 | 184 | 190 | 195 | 201 | -   | -   |     |
|                    | 30%        | -                 | -   | -   | 27  | 37  | 45  | 51  | 65  | 75  | 83  | 98  | 107 | 120 | 128 | 134 | 141 | 146 | 151 | 155 | 159 | 162 | 165 | 182 | 190 | 197 | 204 | 210 | 216 | 221 | 226 | 303 | 307 | 311 | -   | -   |     |
|                    | 20%        | -                 | -   | -   | 43  | 52  | 71  | 83  | 102 | 113 | 130 | 139 | 147 | 153 | 159 | 164 | 180 | 192 | 202 | 211 | 219 | 226 | 305 | 311 | 316 | 321 | 326 |     |     |     |     |     |     |     |     |     |     |

Note: Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 35 16-bay, single-phase, no transformer unit Type F (&amp; UPS model number digit 9 = F)

| UPS Rating       | Load Level | # Battery Strings |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2  | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  |     |
| 5 kVA / 4.5 kW   | 100%       | -                 | 5  | 15  | 26  | 38  | 48  | 61  | 75  | 92  | 103 | 113 | 129 | 137 | 145 | 151 | 156 | 161 | 165 | 183 | 193 | 202 | 210 | 218 | 224 | 302 | 308 | 313 | 318 | 323 | 327 | 331 | 334 | 338 | 341 | 344 |     |
|                  | 90%        | -                 | 6  | 17  | 28  | 43  | 51  | 70  | 82  | 101 | 112 | 129 | 138 | 146 | 152 | 158 | 163 | 167 | 190 | 200 | 209 | 217 | 225 | 303 | 309 | 315 | 320 | 325 | 329 | 333 | 337 | 341 | 344 | 347 | 422 | 425 |     |
|                  | 80%        | -                 | 7  | 20  | 34  | 47  | 63  | 79  | 99  | 111 | 129 | 139 | 148 | 155 | 161 | 166 | 187 | 199 | 209 | 218 | 226 | 305 | 312 | 318 | 323 | 328 | 333 | 337 | 341 | 345 | 420 | 423 | 426 | 429 | 432 | 434 |     |
|                  | 70%        | -                 | 9  | 23  | 40  | 52  | 74  | 96  | 111 | 130 | 141 | 150 | 158 | 164 | 184 | 198 | 209 | 219 | 300 | 308 | 315 | 322 | 328 | 333 | 338 | 342 | 346 | 422 | 425 | 429 | 432 | 434 | 437 | 439 | 442 | 444 |     |
|                  | 60%        | -                 | 11 | 28  | 46  | 68  | 92  | 110 | 131 | 144 | 153 | 161 | 180 | 196 | 209 | 221 | 303 | 312 | 319 | 326 | 332 | 338 | 343 | 420 | 424 | 428 | 431 | 434 | 437 | 440 | 443 | 445 | 447 | 450 | 452 | 453 |     |
|                  | 50%        | -                 | 14 | 36  | 52  | 81  | 108 | 132 | 146 | 157 | 165 | 192 | 208 | 222 | 305 | 315 | 324 | 331 | 338 | 344 | 421 | 426 | 430 | 434 | 437 | 441 | 444 | 446 | 449 | 451 | 454 | 456 | 458 | 459 | 461 | 463 |     |
|                  | 40%        | -                 | 18 | 44  | 73  | 104 | 132 | 149 | 161 | 185 | 206 | 222 | 308 | 319 | 329 | 337 | 344 | 422 | 428 | 433 | 437 | 441 | 445 | 448 | 451 | 453 | 456 | 458 | 460 | 462 | 464 | 466 | 467 | 480 | 480 | 480 |     |
|                  | 30%        | -                 | 25 | 53  | 99  | 133 | 153 | 166 | 202 | 223 | 312 | 325 | 336 | 345 | 424 | 431 | 437 | 441 | 446 | 450 | 453 | 456 | 459 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 20%        | -                 | 38 | 90  | 136 | 160 | 199 | 300 | 320 | 336 | 420 | 429 | 437 | 444 | 449 | 454 | 458 | 462 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | -                 | 73 | 149 | 207 | 320 | 345 | 433 | 445 | 454 | 461 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA / 9 kW    | 100%       | -                 | -  | 5   | 10  | 16  | 21  | 26  | 32  | 39  | 44  | 48  | 52  | 62  | 69  | 76  | 81  | 93  | 99  | 104 | 109 | 120 | 125 | 130 | 134 | 138 | 142 | 145 | 149 | 152 | 154 | 157 | 159 | 162 | 164 | -   |     |
|                  | 90%        | -                 | -  | 6   | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 52  | 64  | 71  | 78  | 83  | 97  | 103 | 108 | 113 | 125 | 131 | 135 | 140 | 144 | 147 | 151 | 154 | 157 | 159 | 162 | 164 | 166 | 182 | 188 | -   |     |
|                  | 80%        | -                 | -  | 7   | 14  | 20  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 101 | 108 | 113 | 126 | 132 | 137 | 142 | 146 | 150 | 153 | 157 | 160 | 162 | 165 | 167 | 185 | 192 | 197 | 203 | 208 | -   |     |
|                  | 70%        | -                 | -  | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 68  | 76  | 90  | 99  | 106 | 113 | 126 | 133 | 138 | 144 | 148 | 152 | 156 | 160 | 163 | 166 | 182 | 189 | 196 | 202 | 208 | 213 | 218 | 223 | 300 | -   |     |
|                  | 60%        | -                 | -  | 11  | 20  | 28  | 40  | 47  | 53  | 70  | 79  | 95  | 104 | 112 | 126 | 133 | 140 | 146 | 151 | 155 | 159 | 163 | 166 | 184 | 192 | 200 | 207 | 213 | 219 | 224 | 302 | 306 | 311 | 315 | 319 | -   |     |
|                  | 50%        | -                 | -  | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100 | 110 | 126 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 187 | 197 | 205 | 213 | 219 | 226 | 304 | 309 | 314 | 319 | 323 | 327 | 331 | 334 | 338 | -   |     |
|                  | 40%        | -                 | -  | 19  | 32  | 46  | 60  | 76  | 95  | 108 | 125 | 136 | 144 | 152 | 158 | 163 | 180 | 192 | 202 | 212 | 220 | 300 | 306 | 313 | 318 | 324 | 328 | 333 | 337 | 341 | 344 | 420 | 423 | 426 | 428 | -   |     |
|                  | 30%        | -                 | -  | 26  | 44  | 62  | 80  | 104 | 124 | 138 | 148 | 156 | 163 | 184 | 198 | 211 | 221 | 303 | 311 | 318 | 325 | 331 | 336 | 341 | 346 | 422 | 425 | 429 | 432 | 435 | 438 | 440 | 443 | 445 | 447 | -   |     |
|                  | 20%        | -                 | -  | 41  | 67  | 98  | 125 | 143 | 156 | 165 | 194 | 212 | 227 | 311 | 321 | 330 | 337 | 344 | 422 | 427 | 432 | 436 | 440 | 443 | 446 | 449 | 452 | 454 | 456 | 459 | 461 | 462 | 464 | 466 | 467 | -   |     |
|                  | 10%        | -                 | -  | 83  | 135 | 159 | 199 | 227 | 320 | 335 | 347 | 429 | 437 | 443 | 449 | 454 | 458 | 461 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |
| 15 kVA / 13.5 kW | 100%       | -                 | -  | 5   | 8   | 12  | 16  | 19  | 22  | 26  | 30  | 35  | 39  | 43  | 47  | 49  | 52  | 61  | 66  | 71  | 76  | 80  | 83  | 94  | 99  | 103 | 107 | 110 | 113 | 123 | 127 | 130 | 134 | 137 | 140 | -   |     |
|                  | 90%        | -                 | -  | 6   | 10  | 14  | 18  | 21  | 26  | 28  | 35  | 40  | 43  | 47  | 49  | 52  | 61  | 66  | 71  | 76  | 80  | 81  | 96  | 101 | 105 | 109 | 113 | 123 | 128 | 131 | 135 | 138 | 141 | 144 | 147 | 150 | -   |
|                  | 80%        | -                 | -  | 7   | 11  | 16  | 20  | 25  | 28  | 35  | 40  | 45  | 48  | 51  | 53  | 65  | 71  | 76  | 80  | 81  | 91  | 96  | 101 | 105 | 109 | 113 | 123 | 128 | 131 | 135 | 138 | 141 | 144 | 147 | 150 | -   |     |
|                  | 70%        | -                 | -  | 9   | 14  | 19  | 25  | 28  | 36  | 42  | 46  | 50  | 53  | 64  | 71  | 77  | 81  | 93  | 99  | 104 | 109 | 113 | 124 | 129 | 133 | 137 | 140 | 144 | 147 | 150 | 153 | 155 | 157 | 160 | -   |     |     |
|                  | 60%        | -                 | -  | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 51  | 63  | 70  | 77  | 83  | 95  | 102 | 107 | 112 | 124 | 129 | 134 | 139 | 143 | 146 | 150 | 153 | 156 | 159 | 161 | 163 | 166 | 180 | 186 | -   |     |     |
|                  | 50%        | -                 | -  | 15  | 22  | 28  | 38  | 45  | 50  | 60  | 69  | 77  | 90  | 98  | 105 | 111 | 124 | 130 | 136 | 141 | 145 | 150 | 153 | 157 | 160 | 163 | 165 | 180 | 187 | 193 | 199 | 205 | 210 | 215 | -   |     |     |
|                  | 40%        | -                 | -  | 19  | 27  | 39  | 46  | 52  | 67  | 77  | 92  | 101 | 109 | 123 | 131 | 138 | 143 | 149 | 153 | 157 | 161 | 164 | 167 | 188 | 195 | 203 | 209 | 215 | 221 | 226 | 303 | 307 | 311 | 315 | -   |     |     |
|                  | 30%        | -                 | -  | 27  | 40  | 49  | 64  | 77  | 95  | 106 | 122 | 132 | 140 | 147 | 153 | 158 | 163 | 167 | 189 | 198 | 207 | 215 | 222 | 300 | 306 | 312 | 317 | 322 | 326 | 330 | 334 | 337 | 341 | 344 | -   |     |     |
|                  | 20%        | -                 | -  | 42  | 53  | 78  | 101 | 121 | 135 | 145 | 154 | 161 | 167 | 193 | 205 | 216 | 226 | 307 | 314 | 321 | 327 | 333 | 338 | 342 | 347 | 422 | 426 | 429 | 432 | 435 | 438 | 440 | 443 | 445 | -   |     |     |
|                  | 10%        | -                 | -  | 92  | 126 | 147 | 161 | 190 | 213 | 302 | 316 | 328 | 338 | 346 | 425 | 431 | 436 | 441 | 445 | 449 | 452 | 455 | 458 | 460 | 463 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |     |
| 20 kVA / 18 kW   | 100%       | -                 | -  | -   | 5   | 8   | 10  | 13  | 16  | 18  | 21  | 23  | 26  | 28  | 32  | 36  | 39  | 42  | 44  | 46  | 48  | 50  | 52  | 53  | 62  | 66  | 69  | 73  | 76  | 78  | 81  | 83  | 93  | -   | -   |     |     |
|                  | 90%        | -                 | -  | -   | 6   | 9   | 11  | 14  | 18  | 20  | 23  | 26  | 28  | 34  | 37  | 41  | 43  | 46  | 48  | 50  | 52  | 53  | 63  | 67  | 71  | 75  | 78  | 81  | 83  | 93  | 96  | 100 | 103 | -   | -   |     |     |
|                  | 80%        | -                 | -  | -   | 7   | 10  | 14  | 17  | 20  | 23  | 27  | 31  | 35  | 39  | 43  | 45  | 48  | 50  | 52  | 61  | 65  | 70  | 74  | 77  | 80  | 83  | 93  | 97  | 101 | 104 | 107 | 110 | 113 | -   | -   |     |     |
|                  | 70%        | -                 | -  | -   | 9   | 13  | 17  | 20  | 25  | 28  | 33  | 38  | 42  | 45  | 48  | 50  | 53  | 62  | 68  | 72  | 76  | 80  | 90  | 94  | 99  | 103 | 106 | 110 | 113 | 122 | 126 | 129 | 133 | -   | -   |     |     |
|                  | 60%        | -                 | -  | -   | 11  | 16  | 20  | 25  | 28  | 35  | 40  | 44  | 48  | 51  | 53  | 65  | 70  | 75  | 80  | 90  | 95  | 100 | 104 | 109 | 112 | 122 | 127 | 130 | 134 | 137 | 141 | 143 | 146 | -   | -   |     |     |
|                  | 50%        | -                 | -  | -   | 15  | 20  | 26  | 31  | 38  | 43  | 47  | 51  | 60  | 67  | 73  | 79  | 90  | 96  | 102 | 107 | 111 | 122 | 127 | 131 | 136 | 139 | 143 | 146 | 149 | 152 | 155 | 157 | 160 | -   | -   |     |     |
|                  | 40%        | -                 | -  | -   | 19  | 26  | 33  | 41  | 46  | 51  | 62  | 70  | 77  | 83  | 97  | 104 | 109 | 121 | 127 | 133 | 138 | 142 | 146 | 150 | 153 | 156 | 159 | 162 | 164 | 167 | 184 | 190 | 195 | -   | -   |     |     |
|                  | 30%        | -                 | -  | -   | 27  | 37  | 45  | 51  | 65  | 75  | 83  | 98  | 107 | 120 | 128 | 134 | 141 | 146 | 151 | 155 | 159 | 162 | 165 | 182 | 190 | 197 | 204 | 210 | 216 | 221 | 226 | 303 | 307 | -   | -   |     |     |
|                  | 20%        | -                 | -  | -   | 43  | 52  | 71  | 83  | 102 | 113 | 130 | 139 | 147 | 153 | 159 | 164 | 180 | 192 | 202 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |



## 7.3 Estimated Battery Run Times

### 7.3.1 Tables for UPS model number digits 1-4 are S5KC

**Table 36 12-bay, single-phase, transformer-based unit Type N (& UPS model number 9 = N)**

| UPS Rating       | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  |     |
| 5 kVA / 4.5kW    | 100%       | 5                 | 15  | 26  | 38  | 47  | 60  | 74  | 90  | 102 | 112 | 127 | 136 | 143 | 150 | 155 | 160 | 164 | 181 | 191 | 200 | 208 | 215 | 222 | 300 | 306 | 311 | 316 | 321 | 325 | 329 | 333 | 336 | 343 |     |
|                  | 90%        | 6                 | 17  | 28  | 42  | 51  | 69  | 82  | 101 | 111 | 128 | 137 | 145 | 152 | 158 | 163 | 167 | 189 | 199 | 208 | 216 | 224 | 302 | 309 | 314 | 319 | 324 | 329 | 333 | 337 | 340 | 343 | 347 | 421 |     |
|                  | 80%        | 7                 | 20  | 34  | 47  | 63  | 79  | 99  | 111 | 129 | 139 | 148 | 155 | 160 | 166 | 187 | 198 | 209 | 218 | 226 | 305 | 312 | 318 | 323 | 328 | 333 | 337 | 341 | 345 | 420 | 423 | 426 | 429 | 432 |     |
|                  | 70%        | 9                 | 23  | 40  | 52  | 74  | 96  | 110 | 130 | 141 | 150 | 157 | 164 | 184 | 197 | 209 | 219 | 300 | 308 | 315 | 321 | 327 | 332 | 337 | 342 | 346 | 422 | 425 | 428 | 431 | 434 | 437 | 439 | 441 |     |
|                  | 60%        | 11                | 27  | 46  | 67  | 92  | 109 | 131 | 143 | 153 | 161 | 167 | 195 | 209 | 220 | 302 | 311 | 319 | 326 | 332 | 338 | 343 | 347 | 423 | 427 | 431 | 434 | 437 | 440 | 442 | 445 | 447 | 449 | 451 |     |
|                  | 50%        | 14                | 36  | 52  | 81  | 108 | 132 | 146 | 157 | 165 | 192 | 208 | 222 | 305 | 315 | 324 | 331 | 338 | 344 | 421 | 426 | 430 | 434 | 437 | 441 | 444 | 446 | 449 | 451 | 453 | 456 | 457 | 459 | 461 |     |
|                  | 40%        | 18                | 44  | 73  | 105 | 133 | 149 | 161 | 186 | 207 | 223 | 309 | 320 | 330 | 338 | 345 | 423 | 428 | 433 | 438 | 441 | 445 | 448 | 451 | 454 | 456 | 459 | 461 | 463 | 464 | 466 | 480 | 480 | 480 |     |
|                  | 30%        | 25                | 53  | 101 | 135 | 154 | 167 | 206 | 227 | 315 | 328 | 338 | 347 | 427 | 433 | 438 | 443 | 448 | 451 | 455 | 458 | 460 | 463 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 20%        | 40                | 96  | 141 | 164 | 208 | 308 | 327 | 342 | 425 | 434 | 441 | 448 | 453 | 457 | 461 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | 82                | 158 | 225 | 333 | 427 | 442 | 453 | 460 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA / 9 kW    | 100%       | -                 | 5   | 10  | 15  | 20  | 26  | 31  | 38  | 43  | 48  | 51  | 61  | 68  | 74  | 80  | 91  | 97  | 103 | 108 | 112 | 123 | 128 | 133 | 137 | 140 | 144 | 147 | 150 | 153 | 156 | 158 | 160 | 163 |     |
|                  | 90%        | -                 | 6   | 11  | 17  | 23  | 28  | 37  | 43  | 47  | 51  | 62  | 70  | 76  | 82  | 95  | 101 | 107 | 112 | 123 | 129 | 134 | 138 | 142 | 146 | 149 | 152 | 155 | 158 | 161 | 163 | 165 | 167 | 185 |     |
|                  | 80%        | -                 | 7   | 13  | 20  | 27  | 35  | 42  | 47  | 52  | 64  | 72  | 79  | 92  | 99  | 106 | 112 | 124 | 130 | 135 | 140 | 144 | 148 | 152 | 155 | 158 | 161 | 164 | 166 | 182 | 189 | 194 | 200 | 205 |     |
|                  | 70%        | -                 | 9   | 16  | 23  | 32  | 41  | 47  | 52  | 66  | 75  | 83  | 97  | 105 | 112 | 125 | 131 | 137 | 142 | 147 | 151 | 155 | 159 | 162 | 165 | 167 | 187 | 193 | 200 | 206 | 211 | 216 | 221 | 226 |     |
|                  | 60%        | -                 | 11  | 20  | 28  | 39  | 47  | 53  | 69  | 79  | 94  | 103 | 111 | 125 | 133 | 139 | 145 | 150 | 155 | 159 | 162 | 166 | 183 | 191 | 199 | 206 | 212 | 218 | 224 | 301 | 305 | 310 | 314 | 318 |     |
|                  | 50%        | -                 | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100 | 110 | 126 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 188 | 197 | 205 | 213 | 220 | 226 | 304 | 309 | 314 | 319 | 323 | 327 | 331 | 334 | 338 |     |
|                  | 40%        | -                 | 19  | 33  | 46  | 60  | 76  | 95  | 108 | 126 | 136 | 145 | 152 | 158 | 163 | 181 | 193 | 203 | 213 | 221 | 300 | 307 | 313 | 319 | 324 | 329 | 333 | 338 | 341 | 345 | 420 | 423 | 426 | 429 |     |
|                  | 30%        | -                 | 26  | 44  | 62  | 81  | 104 | 125 | 138 | 149 | 157 | 164 | 185 | 200 | 212 | 223 | 304 | 312 | 319 | 326 | 332 | 337 | 342 | 346 | 422 | 426 | 430 | 433 | 436 | 438 | 441 | 443 | 446 | 448 |     |
|                  | 20%        | -                 | 41  | 67  | 98  | 126 | 143 | 156 | 165 | 195 | 213 | 227 | 311 | 322 | 330 | 338 | 344 | 422 | 427 | 432 | 436 | 440 | 443 | 447 | 449 | 452 | 455 | 457 | 459 | 461 | 463 | 464 | 466 | 467 |     |
|                  | 10%        | -                 | 83  | 135 | 159 | 197 | 226 | 319 | 335 | 347 | 428 | 436 | 443 | 448 | 453 | 457 | 461 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 15 kVA / 13.5 kW | 100%       | -                 | -   | 5   | 8   | 11  | 15  | 18  | 22  | 26  | 28  | 34  | 38  | 42  | 45  | 47  | 50  | 52  | 60  | 65  | 70  | 74  | 78  | 81  | 91  | 95  | 99  | 102 | 106 | 109 | 112 | 121 | 125 | -   |     |
|                  | 90%        | -                 | -   | 6   | 9   | 13  | 17  | 21  | 25  | 28  | 34  | 39  | 43  | 46  | 49  | 51  | 53  | 65  | 70  | 74  | 78  | 82  | 92  | 97  | 101 | 105 | 108 | 112 | 121 | 125 | 129 | 132 | 135 | -   |     |
|                  | 80%        | -                 | -   | 7   | 11  | 16  | 20  | 25  | 28  | 35  | 40  | 44  | 47  | 50  | 53  | 64  | 70  | 75  | 79  | 83  | 95  | 104 | 108 | 112 | 122 | 126 | 130 | 133 | 137 | 140 | 143 | 146 | -   |     |     |
|                  | 70%        | -                 | -   | 9   | 14  | 18  | 23  | 28  | 35  | 41  | 45  | 49  | 52  | 63  | 69  | 75  | 80  | 91  | 97  | 102 | 107 | 111 | 122 | 127 | 131 | 135 | 139 | 142 | 145 | 148 | 151 | 154 | 156 | -   |     |
|                  | 60%        | -                 | -   | 11  | 17  | 23  | 28  | 36  | 42  | 47  | 51  | 61  | 69  | 76  | 81  | 94  | 100 | 106 | 111 | 122 | 128 | 133 | 137 | 141 | 145 | 148 | 152 | 155 | 157 | 160 | 162 | 165 | 167 | -   |     |
|                  | 50%        | -                 | -   | 14  | 21  | 28  | 37  | 44  | 49  | 53  | 68  | 76  | 83  | 97  | 104 | 110 | 122 | 129 | 134 | 139 | 144 | 148 | 152 | 155 | 159 | 162 | 164 | 167 | 184 | 191 | 197 | 202 | 208 | -   |     |
|                  | 40%        | -                 | -   | 19  | 27  | 38  | 46  | 52  | 67  | 76  | 91  | 100 | 109 | 122 | 130 | 137 | 143 | 148 | 152 | 157 | 160 | 164 | 167 | 186 | 194 | 201 | 207 | 213 | 219 | 224 | 301 | 306 | 310 | -   |     |
|                  | 30%        | -                 | -   | 27  | 40  | 49  | 64  | 77  | 95  | 106 | 122 | 132 | 140 | 147 | 153 | 158 | 163 | 167 | 188 | 198 | 207 | 215 | 222 | 300 | 306 | 312 | 317 | 321 | 326 | 330 | 334 | 337 | 341 | -   |     |
|                  | 20%        | -                 | -   | 43  | 60  | 79  | 102 | 123 | 136 | 147 | 155 | 162 | 181 | 196 | 208 | 219 | 301 | 309 | 316 | 323 | 329 | 335 | 340 | 344 | 420 | 424 | 428 | 431 | 434 | 437 | 439 | 442 | 444 | -   |     |
|                  | 10%        | -                 | -   | 97  | 131 | 151 | 164 | 199 | 220 | 309 | 322 | 333 | 343 | 422 | 429 | 435 | 440 | 444 | 448 | 452 | 455 | 458 | 460 | 463 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 37 12-bay, single-phase, transformer-based unit Type R (& UPS model number 9 = R)

| UPS Rating       | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  |
| 5 kVA / 4.5 kW   | 100%       | 5                 | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100 | 110 | 126 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 187 | 197 | 205 | 213 | 219 | 226 | 304 | 309 | 314 | 319 | 323 | 327 | 331 | 334 | 338 |
|                  | 90%        | 5                 | 16  | 27  | 41  | 50  | 67  | 80  | 98  | 109 | 126 | 135 | 143 | 150 | 156 | 161 | 165 | 185 | 195 | 205 | 213 | 221 | 227 | 306 | 311 | 317 | 322 | 326 | 330 | 334 | 338 | 341 | 344 | 347 |
|                  | 80%        | 7                 | 19  | 33  | 46  | 61  | 76  | 96  | 108 | 126 | 137 | 145 | 152 | 158 | 164 | 182 | 193 | 204 | 213 | 222 | 301 | 308 | 314 | 320 | 325 | 330 | 334 | 338 | 342 | 345 | 421 | 424 | 426 | 429 |
|                  | 70%        | 8                 | 22  | 39  | 50  | 71  | 92  | 107 | 126 | 138 | 147 | 155 | 161 | 167 | 190 | 203 | 213 | 222 | 303 | 310 | 317 | 323 | 328 | 333 | 338 | 342 | 346 | 422 | 425 | 428 | 431 | 434 | 436 | 439 |
|                  | 60%        | 10                | 26  | 44  | 63  | 81  | 105 | 126 | 139 | 149 | 157 | 164 | 186 | 200 | 213 | 223 | 304 | 313 | 320 | 326 | 332 | 338 | 342 | 347 | 423 | 426 | 430 | 433 | 436 | 439 | 441 | 444 | 446 | 448 |
|                  | 50%        | 13                | 32  | 50  | 76  | 102 | 125 | 140 | 152 | 161 | 180 | 197 | 212 | 224 | 307 | 316 | 324 | 331 | 337 | 343 | 420 | 424 | 428 | 432 | 436 | 439 | 442 | 445 | 447 | 449 | 452 | 454 | 456 | 457 |
|                  | 40%        | 16                | 41  | 66  | 97  | 125 | 142 | 155 | 165 | 193 | 211 | 226 | 310 | 320 | 329 | 337 | 343 | 421 | 426 | 431 | 435 | 439 | 443 | 446 | 449 | 451 | 454 | 456 | 458 | 460 | 462 | 464 | 465 | 467 |
|                  | 30%        | 22                | 50  | 91  | 125 | 147 | 161 | 190 | 212 | 302 | 316 | 328 | 337 | 346 | 425 | 431 | 436 | 441 | 445 | 448 | 452 | 455 | 458 | 460 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 20%        | 35                | 79  | 130 | 155 | 188 | 219 | 313 | 329 | 342 | 424 | 432 | 439 | 445 | 450 | 454 | 458 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | 71                | 147 | 203 | 317 | 342 | 431 | 443 | 452 | 459 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA / 9 kW    | 100%       | -                 | 5   | 10  | 15  | 20  | 26  | 31  | 38  | 43  | 47  | 51  | 60  | 67  | 74  | 79  | 90  | 96  | 102 | 107 | 112 | 122 | 127 | 132 | 136 | 140 | 143 | 147 | 150 | 152 | 155 | 158 | 160 | -   |
|                  | 90%        | -                 | 6   | 11  | 17  | 22  | 28  | 36  | 42  | 47  | 51  | 61  | 69  | 75  | 81  | 93  | 100 | 106 | 111 | 122 | 127 | 132 | 137 | 141 | 145 | 148 | 151 | 154 | 157 | 160 | 162 | 164 | 166 | -   |
|                  | 80%        | -                 | 7   | 13  | 19  | 26  | 34  | 41  | 47  | 51  | 63  | 71  | 78  | 90  | 98  | 105 | 110 | 122 | 128 | 134 | 139 | 143 | 147 | 151 | 154 | 157 | 160 | 163 | 165 | 167 | 186 | 192 | 197 | -   |
|                  | 70%        | -                 | 9   | 16  | 23  | 31  | 40  | 47  | 51  | 65  | 74  | 81  | 95  | 103 | 110 | 123 | 129 | 135 | 141 | 145 | 150 | 154 | 157 | 160 | 163 | 166 | 183 | 190 | 196 | 202 | 208 | 213 | 218 | -   |
|                  | 60%        | -                 | 11  | 19  | 27  | 38  | 46  | 52  | 67  | 77  | 91  | 101 | 109 | 123 | 131 | 137 | 143 | 148 | 153 | 157 | 161 | 164 | 167 | 187 | 195 | 202 | 208 | 214 | 220 | 225 | 302 | 307 | 311 | -   |
|                  | 50%        | -                 | 14  | 25  | 36  | 46  | 52  | 70  | 81  | 98  | 108 | 122 | 132 | 139 | 146 | 152 | 157 | 161 | 165 | 182 | 192 | 200 | 208 | 215 | 222 | 300 | 305 | 310 | 315 | 319 | 324 | 327 | 331 | -   |
|                  | 40%        | -                 | 18  | 30  | 44  | 52  | 73  | 91  | 105 | 121 | 132 | 141 | 149 | 155 | 161 | 165 | 186 | 197 | 206 | 215 | 223 | 302 | 308 | 314 | 320 | 325 | 329 | 333 | 337 | 341 | 344 | 420 | 423 | -   |
|                  | 30%        | -                 | 25  | 42  | 53  | 77  | 100 | 120 | 134 | 144 | 153 | 160 | 166 | 191 | 204 | 215 | 225 | 305 | 313 | 320 | 326 | 332 | 337 | 341 | 346 | 421 | 425 | 428 | 432 | 434 | 437 | 440 | 442 | -   |
|                  | 20%        | -                 | 38  | 61  | 91  | 112 | 137 | 150 | 161 | 182 | 201 | 217 | 302 | 313 | 322 | 330 | 337 | 343 | 421 | 426 | 430 | 434 | 438 | 442 | 445 | 447 | 450 | 452 | 455 | 457 | 459 | 461 | 462 | -   |
|                  | 10%        | -                 | 75  | 124 | 151 | 167 | 211 | 306 | 323 | 336 | 347 | 428 | 435 | 441 | 447 | 451 | 455 | 459 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |
| 15 kVA / 13.5 kW | 100%       | -                 | -   | 5   | 8   | 11  | 15  | 18  | 22  | 26  | 28  | 33  | 38  | 41  | 45  | 47  | 50  | 52  | 60  | 65  | 70  | 74  | 77  | 81  | 90  | 94  | 98  | 102 | 105 | 109 | 112 | 121 | 124 | -   |
|                  | 90%        | -                 | -   | 6   | 9   | 13  | 17  | 21  | 25  | 28  | 34  | 38  | 42  | 46  | 48  | 51  | 53  | 64  | 69  | 74  | 78  | 81  | 91  | 96  | 100 | 104 | 108 | 111 | 120 | 124 | 128 | 131 | 134 | -   |
|                  | 80%        | -                 | -   | 7   | 11  | 16  | 20  | 25  | 28  | 34  | 39  | 43  | 47  | 50  | 52  | 63  | 69  | 74  | 78  | 82  | 93  | 98  | 103 | 107 | 111 | 121 | 125 | 129 | 132 | 136 | 139 | 142 | 145 | -   |
|                  | 70%        | -                 | -   | 9   | 13  | 18  | 23  | 28  | 35  | 40  | 45  | 49  | 52  | 62  | 69  | 74  | 79  | 90  | 96  | 101 | 106 | 111 | 121 | 126 | 130 | 134 | 138 | 141 | 145 | 148 | 150 | 153 | 155 | -   |
|                  | 60%        | -                 | -   | 11  | 17  | 22  | 28  | 36  | 42  | 47  | 51  | 60  | 68  | 75  | 81  | 93  | 99  | 105 | 110 | 121 | 127 | 132 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 159 | 162 | 164 | 166 | -   |
|                  | 50%        | -                 | -   | 14  | 21  | 27  | 36  | 43  | 49  | 53  | 67  | 75  | 82  | 95  | 103 | 109 | 121 | 127 | 133 | 138 | 143 | 147 | 151 | 155 | 158 | 161 | 163 | 166 | 182 | 188 | 194 | 200 | 206 | -   |
|                  | 40%        | -                 | -   | 18  | 27  | 37  | 45  | 51  | 65  | 75  | 83  | 99  | 107 | 120 | 128 | 135 | 141 | 146 | 151 | 155 | 159 | 162 | 166 | 182 | 190 | 197 | 204 | 210 | 216 | 221 | 226 | 303 | 308 | -   |
|                  | 30%        | -                 | -   | 26  | 38  | 48  | 61  | 75  | 91  | 103 | 113 | 129 | 137 | 144 | 151 | 156 | 161 | 165 | 183 | 193 | 202 | 210 | 217 | 224 | 302 | 308 | 313 | 318 | 322 | 326 | 330 | 334 | 337 | -   |
|                  | 20%        | -                 | -   | 41  | 52  | 75  | 97  | 112 | 131 | 142 | 151 | 159 | 165 | 186 | 200 | 211 | 221 | 302 | 310 | 317 | 323 | 329 | 334 | 339 | 343 | 347 | 423 | 426 | 430 | 432 | 435 | 480 | 480 | -   |
|                  | 10%        | -                 | -   | 82  | 121 | 143 | 158 | 183 | 206 | 225 | 311 | 323 | 333 | 342 | 421 | 427 | 433 | 438 | 442 | 446 | 449 | 453 | 455 | 458 | 460 | 463 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | -   |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 38 12-bay, single-phase, transformer-based unit Type F (&amp; UPS model number 9 = F)

| UPS Rating        | Load Level | # Battery Strings |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-------------------|------------|-------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                   |            | 1                 | 2  | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  |     |
| 5 kVA /<br>4.5 kW | 100%       | -                 | 5  | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100 | 110 | 126 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 187 | 197 | 205 | 213 | 219 | 226 | 304 | 309 | 314 | 319 | 323 | 327 | 331 | 334 |     |
|                   | 90%        | -                 | 5  | 16  | 27  | 41  | 50  | 67  | 80  | 98  | 109 | 126 | 135 | 143 | 150 | 156 | 161 | 165 | 185 | 195 | 205 | 213 | 221 | 227 | 306 | 311 | 317 | 322 | 326 | 330 | 334 | 338 | 341 | 344 |     |
|                   | 80%        | -                 | 7  | 19  | 33  | 46  | 61  | 76  | 96  | 108 | 126 | 137 | 145 | 152 | 158 | 164 | 182 | 193 | 204 | 213 | 222 | 301 | 308 | 314 | 320 | 325 | 330 | 334 | 338 | 342 | 345 | 421 | 424 | 426 |     |
|                   | 70%        | -                 | 8  | 22  | 39  | 50  | 71  | 92  | 107 | 126 | 138 | 147 | 155 | 161 | 167 | 190 | 203 | 213 | 222 | 303 | 310 | 317 | 323 | 328 | 333 | 338 | 342 | 346 | 422 | 425 | 428 | 431 | 434 | 436 |     |
|                   | 60%        | -                 | 10 | 26  | 44  | 63  | 81  | 105 | 126 | 139 | 149 | 157 | 164 | 186 | 200 | 213 | 223 | 304 | 313 | 320 | 326 | 332 | 338 | 342 | 347 | 423 | 426 | 430 | 433 | 436 | 439 | 441 | 444 | 446 |     |
|                   | 50%        | -                 | 13 | 32  | 50  | 76  | 102 | 125 | 140 | 152 | 161 | 180 | 197 | 212 | 224 | 307 | 316 | 324 | 331 | 337 | 343 | 420 | 424 | 428 | 432 | 436 | 439 | 442 | 445 | 447 | 449 | 452 | 454 | 456 |     |
|                   | 40%        | -                 | 16 | 41  | 66  | 97  | 125 | 142 | 155 | 165 | 193 | 211 | 226 | 310 | 320 | 329 | 337 | 343 | 421 | 426 | 431 | 435 | 439 | 443 | 446 | 449 | 451 | 454 | 456 | 458 | 460 | 462 | 464 | 465 |     |
|                   | 30%        | -                 | 22 | 50  | 91  | 125 | 147 | 161 | 190 | 212 | 302 | 316 | 328 | 337 | 346 | 425 | 431 | 436 | 441 | 445 | 448 | 452 | 455 | 458 | 460 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                   | 20%        | -                 | 35 | 79  | 130 | 155 | 188 | 219 | 313 | 329 | 342 | 424 | 432 | 439 | 445 | 450 | 454 | 458 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                   | 10%        | -                 | 71 | 147 | 203 | 317 | 342 | 431 | 443 | 452 | 459 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA /<br>9 kW  | 100%       | -                 | -  | 5   | 10  | 15  | 20  | 26  | 31  | 38  | 43  | 47  | 51  | 60  | 67  | 74  | 79  | 90  | 96  | 102 | 107 | 112 | 122 | 127 | 132 | 136 | 140 | 143 | 147 | 150 | 152 | 155 | 158 | -   |     |
|                   | 90%        | -                 | -  | 6   | 11  | 17  | 22  | 28  | 36  | 42  | 47  | 51  | 61  | 69  | 75  | 81  | 93  | 100 | 106 | 111 | 122 | 127 | 132 | 137 | 141 | 145 | 148 | 151 | 154 | 157 | 160 | 162 | 164 | -   |     |
|                   | 80%        | -                 | -  | 7   | 13  | 19  | 26  | 34  | 41  | 47  | 51  | 63  | 71  | 78  | 90  | 98  | 105 | 110 | 122 | 128 | 134 | 139 | 143 | 147 | 151 | 154 | 157 | 160 | 163 | 165 | 167 | 186 | 192 | -   |     |
|                   | 70%        | -                 | -  | 9   | 16  | 23  | 31  | 40  | 47  | 51  | 65  | 74  | 81  | 95  | 103 | 110 | 123 | 129 | 135 | 141 | 145 | 150 | 154 | 157 | 160 | 163 | 166 | 183 | 190 | 196 | 202 | 208 | 213 | -   |     |
|                   | 60%        | -                 | -  | 11  | 19  | 27  | 38  | 46  | 52  | 67  | 77  | 91  | 101 | 109 | 123 | 131 | 137 | 143 | 148 | 153 | 157 | 161 | 164 | 167 | 187 | 195 | 202 | 208 | 214 | 220 | 225 | 302 | 307 | -   |     |
|                   | 50%        | -                 | -  | 14  | 25  | 36  | 46  | 52  | 70  | 81  | 98  | 108 | 122 | 132 | 139 | 146 | 152 | 157 | 161 | 165 | 182 | 192 | 200 | 208 | 215 | 222 | 300 | 305 | 310 | 315 | 319 | 324 | 327 | -   |     |
|                   | 40%        | -                 | -  | 18  | 30  | 44  | 52  | 73  | 91  | 105 | 121 | 132 | 141 | 149 | 155 | 161 | 165 | 186 | 197 | 206 | 215 | 223 | 302 | 308 | 314 | 320 | 325 | 329 | 333 | 337 | 341 | 344 | 420 | -   |     |
|                   | 30%        | -                 | -  | 25  | 42  | 53  | 77  | 100 | 120 | 134 | 144 | 153 | 160 | 166 | 191 | 204 | 215 | 225 | 305 | 313 | 320 | 326 | 332 | 337 | 341 | 346 | 421 | 425 | 428 | 432 | 434 | 437 | 440 | -   |     |
|                   | 20%        | -                 | -  | 38  | 61  | 91  | 112 | 137 | 150 | 161 | 182 | 201 | 217 | 302 | 313 | 322 | 330 | 337 | 343 | 421 | 426 | 430 | 434 | 438 | 442 | 445 | 447 | 450 | 452 | 455 | 457 | 459 | 461 | -   |     |
|                   | 10%        | -                 | -  | 75  | 124 | 151 | 167 | 211 | 306 | 323 | 336 | 347 | 428 | 435 | 441 | 447 | 451 | 455 | 459 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



## 7.4 Estimated Battery Run Times

### 7.4.1 Tables for UPS Model Number Where Digits 1-4 are S5KD

**Table 39 16-bay, single-phase, transformer-based unit Type N (& UPS model number 9 = N)**

| UPS Rating       | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  |
| 5 kVA / 4.5 kW   | 100%       | 5                 | 15  | 26  | 38  | 47  | 60  | 74  | 90  | 102 | 111 | 127 | 136 | 143 | 149 | 155 | 160 | 164 | 180 | 190 | 199 | 207 | 215 | 222 | 300 | 306 | 311 | 316 | 320 | 325 | 329 | 332 | 336 | 339 | 342 | 345 |
|                  | 90%        | 6                 | 17  | 28  | 42  | 51  | 69  | 81  | 100 | 111 | 128 | 137 | 145 | 152 | 157 | 162 | 167 | 188 | 198 | 208 | 216 | 223 | 302 | 308 | 314 | 319 | 324 | 328 | 332 | 336 | 340 | 343 | 346 | 349 | 352 | 355 |
|                  | 80%        | 7                 | 19  | 34  | 47  | 63  | 78  | 98  | 110 | 128 | 139 | 147 | 154 | 160 | 165 | 169 | 174 | 198 | 208 | 217 | 225 | 304 | 311 | 317 | 322 | 327 | 332 | 336 | 340 | 344 | 347 | 350 | 353 | 356 | 359 | 362 |
|                  | 70%        | 9                 | 23  | 40  | 51  | 74  | 95  | 110 | 129 | 141 | 150 | 157 | 163 | 168 | 173 | 178 | 183 | 208 | 218 | 227 | 307 | 314 | 321 | 327 | 332 | 337 | 341 | 345 | 349 | 353 | 357 | 361 | 364 | 367 | 370 | 373 |
|                  | 60%        | 11                | 27  | 46  | 67  | 91  | 109 | 130 | 143 | 153 | 160 | 167 | 174 | 180 | 185 | 190 | 195 | 220 | 230 | 239 | 309 | 316 | 323 | 329 | 334 | 339 | 343 | 347 | 351 | 355 | 359 | 363 | 367 | 371 | 374 | 377 |
|                  | 50%        | 14                | 35  | 52  | 80  | 107 | 131 | 145 | 166 | 181 | 190 | 207 | 221 | 230 | 234 | 238 | 242 | 267 | 277 | 286 | 316 | 323 | 330 | 337 | 343 | 348 | 352 | 356 | 360 | 364 | 368 | 372 | 376 | 380 | 383 | 386 |
|                  | 40%        | 18                | 44  | 73  | 104 | 132 | 149 | 160 | 185 | 206 | 222 | 238 | 252 | 261 | 265 | 269 | 273 | 303 | 313 | 322 | 352 | 359 | 366 | 373 | 379 | 384 | 388 | 392 | 396 | 400 | 404 | 408 | 412 | 415 | 418 |     |
|                  | 30%        | 25                | 53  | 100 | 134 | 154 | 167 | 205 | 226 | 244 | 263 | 282 | 301 | 310 | 314 | 318 | 322 | 352 | 362 | 371 | 401 | 408 | 415 | 422 | 428 | 433 | 437 | 441 | 445 | 449 | 453 | 457 | 461 | 464 | 467 |     |
|                  | 20%        | 40                | 94  | 140 | 163 | 206 | 236 | 266 | 306 | 326 | 346 | 366 | 386 | 406 | 416 | 420 | 424 | 454 | 464 | 473 | 503 | 510 | 517 | 524 | 530 | 534 | 538 | 542 | 546 | 550 | 554 | 558 | 562 | 565 | 568 |     |
|                  | 10%        | 81                | 157 | 222 | 331 | 426 | 441 | 451 | 459 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
| 10 kVA / 9 kW    | 100%       | -                 | 5   | 10  | 15  | 20  | 26  | 31  | 38  | 43  | 48  | 51  | 61  | 68  | 74  | 80  | 91  | 97  | 103 | 108 | 112 | 123 | 128 | 133 | 137 | 140 | 144 | 147 | 150 | 153 | 156 | 158 | 160 | 163 | 166 |     |
|                  | 90%        | -                 | 6   | 11  | 17  | 23  | 28  | 37  | 43  | 47  | 51  | 62  | 70  | 76  | 82  | 89  | 101 | 107 | 112 | 117 | 123 | 129 | 134 | 138 | 142 | 146 | 149 | 152 | 155 | 158 | 161 | 163 | 165 | 167 | 169 |     |
|                  | 80%        | -                 | 7   | 13  | 20  | 27  | 35  | 42  | 47  | 52  | 64  | 72  | 79  | 92  | 99  | 106 | 112 | 124 | 130 | 135 | 140 | 144 | 148 | 152 | 155 | 158 | 161 | 164 | 166 | 168 | 170 | 172 | 174 | 176 | 178 |     |
|                  | 70%        | -                 | 9   | 16  | 23  | 32  | 41  | 47  | 52  | 66  | 75  | 83  | 97  | 105 | 112 | 125 | 131 | 137 | 142 | 147 | 151 | 155 | 159 | 162 | 165 | 167 | 169 | 171 | 173 | 175 | 177 | 179 | 181 | 183 | 185 |     |
|                  | 60%        | -                 | 11  | 20  | 28  | 39  | 47  | 53  | 69  | 79  | 94  | 103 | 111 | 125 | 133 | 139 | 145 | 150 | 155 | 159 | 162 | 166 | 168 | 170 | 172 | 174 | 176 | 178 | 180 | 182 | 184 | 186 | 188 | 190 | 192 |     |
|                  | 50%        | -                 | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100 | 110 | 126 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 171 | 174 | 177 | 180 | 182 | 184 | 186 | 188 | 190 | 192 | 194 | 196 | 198 | 200 | 202 | 204 |     |
|                  | 40%        | -                 | 19  | 32  | 46  | 60  | 76  | 95  | 108 | 125 | 136 | 145 | 152 | 158 | 163 | 168 | 172 | 176 | 180 | 183 | 186 | 188 | 190 | 192 | 194 | 196 | 198 | 200 | 202 | 204 | 206 | 208 | 210 | 212 | 214 |     |
|                  | 30%        | -                 | 26  | 44  | 62  | 81  | 104 | 125 | 138 | 149 | 157 | 164 | 185 | 199 | 212 | 222 | 230 | 234 | 237 | 240 | 242 | 244 | 246 | 248 | 250 | 252 | 254 | 256 | 258 | 260 | 262 | 264 | 266 | 268 | 270 |     |
|                  | 20%        | -                 | 41  | 67  | 98  | 126 | 143 | 156 | 165 | 195 | 213 | 227 | 231 | 231 | 230 | 238 | 244 | 242 | 247 | 252 | 256 | 259 | 261 | 263 | 265 | 267 | 269 | 271 | 273 | 275 | 277 | 279 | 281 | 283 | 285 |     |
|                  | 10%        | -                 | 83  | 135 | 159 | 197 | 226 | 239 | 335 | 347 | 428 | 436 | 443 | 449 | 453 | 457 | 461 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
| 15 kVA / 13.5 kW | 100%       | -                 | 5   | 8   | 11  | 15  | 18  | 22  | 26  | 28  | 34  | 38  | 42  | 45  | 48  | 51  | 53  | 52  | 61  | 66  | 70  | 74  | 78  | 81  | 81  | 91  | 95  | 99  | 103 | 106 | 109 | 112 | 121 | 125 | 128 | 131 |
|                  | 90%        | -                 | 6   | 9   | 13  | 17  | 21  | 25  | 28  | 34  | 39  | 43  | 46  | 49  | 51  | 53  | 53  | 65  | 70  | 74  | 78  | 82  | 82  | 92  | 97  | 101 | 105 | 109 | 112 | 121 | 125 | 129 | 132 | 135 | 138 |     |
|                  | 80%        | -                 | 7   | 11  | 16  | 20  | 25  | 28  | 35  | 40  | 44  | 47  | 50  | 53  | 54  | 57  | 58  | 70  | 75  | 79  | 83  | 85  | 90  | 94  | 100 | 104 | 108 | 112 | 122 | 126 | 130 | 134 | 137 | 140 | 143 |     |
|                  | 70%        | -                 | 9   | 14  | 18  | 23  | 28  | 35  | 41  | 45  | 49  | 52  | 56  | 60  | 63  | 67  | 70  | 81  | 86  | 90  | 94  | 97  | 103 | 107 | 112 | 122 | 127 | 131 | 135 | 139 | 142 | 146 | 149 | 151 | 154 |     |
|                  | 60%        | -                 | 11  | 17  | 23  | 28  | 36  | 42  | 47  | 51  | 56  | 61  | 69  | 76  | 81  | 84  | 89  | 100 | 106 | 111 | 122 | 128 | 133 | 137 | 141 | 145 | 149 | 152 | 155 | 157 | 160 | 162 | 165 | 167 | 168 |     |
|                  | 50%        | -                 | 14  | 21  | 28  | 37  | 44  | 49  | 53  | 68  | 76  | 83  | 97  | 104 | 110 | 112 | 112 | 129 | 134 | 139 | 144 | 148 | 152 | 155 | 159 | 162 | 164 | 167 | 169 | 171 | 173 | 175 | 177 | 179 | 181 |     |
|                  | 40%        | -                 | 19  | 27  | 38  | 46  | 52  | 66  | 76  | 91  | 100 | 108 | 122 | 130 | 137 | 142 | 148 | 152 | 157 | 160 | 164 | 167 | 168 | 170 | 172 | 174 | 176 | 178 | 180 | 182 | 184 | 186 | 188 | 190 | 192 |     |
|                  | 30%        | -                 | 27  | 40  | 49  | 64  | 77  | 94  | 106 | 122 | 132 | 140 | 147 | 153 | 158 | 163 | 167 | 168 | 188 | 198 | 207 | 214 | 222 | 230 | 239 | 244 | 247 | 250 | 252 | 254 | 256 | 258 | 260 | 262 | 264 |     |
|                  | 20%        | -                 | 43  | 60  | 79  | 102 | 122 | 136 | 147 | 155 | 162 | 181 | 195 | 208 | 219 | 230 | 239 | 244 | 264 | 274 | 283 | 290 | 304 | 313 | 323 | 334 | 344 | 349 | 352 | 354 | 356 | 358 | 360 | 362 | 364 |     |
|                  | 10%        | -                 | 96  | 130 | 151 | 164 | 198 | 220 | 239 | 262 | 283 | 304 | 323 | 342 | 354 | 366 | 377 | 404 | 414 | 423 | 432 | 441 | 450 | 459 | 468 | 477 | 486 | 495 | 504 | 513 | 522 | 531 | 540 | 549 | 558 |     |
| 20 kVA / 18 kW   | 100%       | -                 | 5   | 7   | 10  | 12  | 15  | 18  | 20  | 23  | 26  | 28  | 32  | 36  | 40  | 43  | 45  | 43  | 45  | 47  | 49  | 51  | 53  | 52  | 52  | 60  | 64  | 67  | 70  | 74  | 76  | 79  | 81  | 90  | 93  |     |
|                  | 90%        | -                 | 6   | 9   | 11  | 14  | 17  | 20  | 23  | 27  | 30  | 35  | 38  | 42  | 45  | 47  | 47  | 50  | 52  | 53  | 54  | 56  | 57  | 57  | 66  | 69  | 73  | 76  | 79  | 82  | 85  | 88  | 91  | 94  |     |     |
|                  | 80%        | -                 | 7   | 10  | 13  | 17  | 20  | 23  | 27  | 30  | 35  | 38  | 42  | 45  | 47  | 47  | 50  | 52  | 53  | 54  | 56  | 57  | 57  | 66  | 69  | 73  | 76  | 79  | 82  | 85  | 88  | 91  | 94  | 101 |     |     |
|                  | 70%        | -                 | 9   | 12  | 16  | 20  | 23  | 27  | 32  | 37  | 41  | 44  | 47  | 50  | 53  | 54  | 57  | 59  | 60  | 61  | 62  | 63  | 64  | 64  | 73  | 76  | 79  | 82  | 85  | 88  | 91  | 94  | 101 | 104 | 106 |     |
|                  | 60%        | -                 | 11  | 16  | 20  | 25  | 28  | 35  | 40  | 44  | 47  | 50  | 53  | 56  | 59  | 62  | 64  | 67  | 69  | 70  | 71  | 72  | 73  | 73  | 82  | 85  | 88  | 91  | 94  | 97  | 100 | 103 | 106 | 109 |     |     |
|                  | 50%        | -                 | 14  | 20  | 25  | 30  | 37  | 43  | 47  | 50  | 53  | 56  | 60  | 63  | 67  | 70  | 73  | 76  | 78  | 79  | 80  | 81  | 82  | 82  | 91  | 94  | 97  | 100 | 103 | 106 | 109 | 112 | 115 | 118 |     |     |
|                  | 40%        | -                 | 19  | 26  | 33  | 41  | 46  | 51  | 61  | 70  | 77  | 83  | 97  | 103 | 109 | 121 | 127 | 132 | 137 | 142 | 146 | 150 | 153 | 156 | 159 | 162 | 164 | 167 | 169 | 171 | 173 | 175 | 177 | 179 |     |     |
|                  | 30%        | -                 | 27  | 37  | 45  | 51  | 65  | 75  | 83  | 98  | 107 | 120 | 128 | 135 | 141 | 146 | 151 | 155 | 159 | 162 | 165 | 168 | 171 | 174 | 177 | 180 | 182 | 184 | 186 | 188 | 190 | 192 | 194 | 196 |     |     |
|                  | 20%        | -                 | 43  | 52  | 71  | 83  | 102 | 113 | 130 | 139 | 147 | 153 | 159 | 164 | 168 | 171 | 174 | 177 | 180 | 183 | 186 | 189 | 192 | 195 | 198 | 201 | 204 | 207 | 210 | 213 | 216 | 219 | 222 | 225 |     |     |
|                  | 10%        | -                 | 96  | 123 | 141 | 154 | 164 | 190 | 209 | 223 | 238 | 253 | 268 | 283 | 298 | 313 | 328 | 343 | 358 | 373 | 388 | 403 | 418 | 433 | 448 | 463 | 478 | 493 | 508 | 523 | 538 | 553 | 568 | 583 | 598 |     |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 40 16-bay, single-phase, transformer-based unit Type R (&amp; UPS model number 96 = R)

| UPS Rating         | Load Level | # Battery Strings |     |     |     |     |     |     |     |       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
|--------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
|                    |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9     | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  |     |     |   |
| 5 kVA/<br>4.5 kW   | 100%       | 5                 | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100   | 110 | 125 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 187 | 196 | 205 | 212 | 219 | 226 | 303 | 309 | 314 | 318 | 323 | 327 | 331 | 334 | 337 | 341 | 343 |     |     |   |
|                    | 90%        | 5                 | 16  | 27  | 41  | 50  | 67  | 80  | 98  | 109   | 126 | 135 | 143 | 150 | 156 | 161 | 165 | 185 | 195 | 204 | 213 | 220 | 227 | 305 | 311 | 317 | 321 | 326 | 330 | 334 | 338 | 341 | 344 | 347 | 422 | 425 |     |     |   |
|                    | 80%        | 7                 | 19  | 33  | 46  | 60  | 76  | 96  | 108 | 126   | 136 | 145 | 152 | 158 | 164 | 181 | 193 | 204 | 213 | 221 | 301 | 308 | 314 | 319 | 325 | 329 | 334 | 338 | 342 | 345 | 420 | 423 | 426 | 429 | 432 | 434 |     |     |   |
|                    | 70%        | 8                 | 22  | 38  | 50  | 71  | 92  | 107 | 126 | 137   | 147 | 155 | 161 | 166 | 190 | 202 | 213 | 222 | 302 | 310 | 317 | 323 | 328 | 333 | 338 | 342 | 346 | 421 | 425 | 428 | 431 | 434 | 436 | 439 | 441 | 443 |     |     |   |
|                    | 60%        | 10                | 26  | 44  | 63  | 81  | 105 | 125 | 139 | 149   | 157 | 164 | 186 | 200 | 212 | 223 | 304 | 312 | 320 | 326 | 332 | 337 | 342 | 347 | 423 | 426 | 430 | 433 | 436 | 439 | 441 | 444 | 446 | 448 | 450 | 452 |     |     |   |
|                    | 50%        | 13                | 32  | 50  | 76  | 102 | 125 | 140 | 152 | 160   | 180 | 197 | 212 | 224 | 306 | 316 | 324 | 331 | 337 | 342 | 420 | 424 | 428 | 432 | 436 | 439 | 442 | 444 | 447 | 449 | 452 | 454 | 456 | 457 | 459 | 461 |     |     |   |
|                    | 40%        | 16                | 41  | 66  | 97  | 124 | 142 | 155 | 165 | 193   | 211 | 226 | 310 | 320 | 329 | 336 | 343 | 421 | 426 | 431 | 435 | 439 | 443 | 446 | 449 | 451 | 454 | 456 | 458 | 460 | 462 | 464 | 465 | 467 | 480 | 480 |     |     |   |
|                    | 30%        | 22                | 50  | 91  | 125 | 146 | 160 | 189 | 212 | 301   | 316 | 327 | 337 | 345 | 424 | 430 | 436 | 440 | 444 | 448 | 452 | 455 | 457 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |   |
|                    | 20%        | 34                | 79  | 129 | 155 | 187 | 218 | 312 | 328 | 341   | 423 | 432 | 439 | 445 | 450 | 454 | 458 | 461 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |   |
|                    | 10%        | 70                | 146 | 201 | 315 | 341 | 430 | 442 | 451 | 459   | 464 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |   |
| 10 kVA/<br>9 kW    | 100%       | -                 | 5   | 10  | 15  | 20  | 26  | 31  | 38  | 43    | 47  | 51  | 60  | 67  | 74  | 79  | 90  | 96  | 102 | 107 | 112 | 122 | 127 | 132 | 136 | 140 | 143 | 147 | 150 | 152 | 155 | 158 | 160 | 162 | 164 | -   | -   |     |   |
|                    | 90%        | -                 | 6   | 11  | 17  | 22  | 28  | 36  | 42  | 47    | 51  | 61  | 69  | 75  | 81  | 93  | 100 | 106 | 111 | 122 | 127 | 132 | 137 | 141 | 145 | 148 | 151 | 154 | 157 | 160 | 162 | 164 | 166 | 182 | 188 | -   | -   |     |   |
|                    | 80%        | -                 | 7   | 13  | 19  | 26  | 34  | 41  | 47  | 51    | 62  | 71  | 78  | 90  | 98  | 104 | 110 | 122 | 128 | 134 | 138 | 143 | 147 | 151 | 154 | 157 | 160 | 163 | 166 | 183 | 190 | 196 | 202 | 208 | 213 | 218 | 223 | 227 | - |
|                    | 70%        | -                 | 9   | 16  | 23  | 31  | 40  | 47  | 51  | 65    | 74  | 81  | 95  | 103 | 110 | 122 | 129 | 135 | 141 | 145 | 150 | 154 | 157 | 160 | 163 | 166 | 183 | 190 | 196 | 202 | 208 | 213 | 218 | 223 | 227 | -   | -   |     |   |
|                    | 60%        | -                 | 11  | 19  | 27  | 38  | 46  | 52  | 67  | 77    | 92  | 101 | 109 | 123 | 131 | 137 | 143 | 148 | 153 | 157 | 161 | 164 | 167 | 187 | 195 | 202 | 208 | 214 | 220 | 225 | 302 | 307 | 311 | 315 | 319 | -   | -   |     |   |
|                    | 50%        | -                 | 14  | 25  | 36  | 46  | 52  | 70  | 81  | 98    | 108 | 123 | 132 | 139 | 146 | 152 | 157 | 161 | 165 | 182 | 192 | 200 | 208 | 215 | 222 | 300 | 305 | 310 | 315 | 320 | 324 | 328 | 331 | 335 | 338 | -   | -   |     |   |
|                    | 40%        | -                 | 18  | 30  | 44  | 52  | 73  | 91  | 105 | 121   | 132 | 141 | 149 | 155 | 161 | 165 | 186 | 197 | 206 | 215 | 223 | 302 | 308 | 314 | 320 | 325 | 329 | 333 | 337 | 341 | 344 | 420 | 423 | 425 | 428 | -   | -   |     |   |
|                    | 30%        | -                 | 25  | 42  | 53  | 77  | 100 | 120 | 134 | 144   | 153 | 160 | 166 | 191 | 204 | 215 | 225 | 305 | 313 | 320 | 326 | 332 | 337 | 341 | 346 | 422 | 425 | 428 | 432 | 434 | 437 | 440 | 442 | 444 | 446 | -   | -   |     |   |
|                    | 20%        | -                 | 38  | 61  | 91  | 112 | 137 | 150 | 161 | 182   | 201 | 217 | 302 | 312 | 322 | 330 | 337 | 343 | 421 | 426 | 430 | 434 | 438 | 441 | 445 | 447 | 450 | 452 | 455 | 457 | 459 | 461 | 462 | 464 | 465 | -   | -   |     |   |
|                    | 10%        | -                 | 75  | 124 | 151 | 167 | 210 | 305 | 322 | 336   | 347 | 427 | 435 | 441 | 446 | 451 | 455 | 458 | 462 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   | - |
| 15 kVA/<br>13.5 kW | 100%       | -                 | -   | 5   | 8   | 11  | 15  | 18  | 22  | 26    | 28  | 33  | 38  | 41  | 45  | 47  | 50  | 52  | 60  | 65  | 70  | 74  | 77  | 81  | 90  | 94  | 98  | 102 | 105 | 109 | 112 | 121 | 124 | 127 | 130 | -   | -   |     |   |
|                    | 90%        | -                 | -   | 6   | 9   | 13  | 17  | 21  | 25  | 28    | 34  | 38  | 42  | 46  | 48  | 51  | 53  | 64  | 69  | 74  | 78  | 81  | 91  | 96  | 100 | 104 | 108 | 111 | 120 | 124 | 128 | 131 | 134 | 137 | 140 | -   | -   |     |   |
|                    | 80%        | -                 | -   | 7   | 11  | 16  | 20  | 25  | 28  | 34    | 39  | 43  | 47  | 50  | 52  | 63  | 69  | 74  | 78  | 82  | 93  | 98  | 103 | 107 | 111 | 121 | 125 | 129 | 132 | 136 | 139 | 142 | 145 | 147 | 150 | -   | -   |     |   |
|                    | 70%        | -                 | -   | 9   | 13  | 18  | 23  | 28  | 35  | 40    | 45  | 49  | 52  | 62  | 69  | 74  | 79  | 90  | 96  | 101 | 106 | 111 | 121 | 126 | 130 | 134 | 138 | 141 | 145 | 148 | 150 | 153 | 155 | 158 | 160 | -   | -   |     |   |
|                    | 60%        | -                 | -   | 11  | 17  | 22  | 28  | 36  | 42  | 47    | 51  | 60  | 68  | 75  | 81  | 93  | 99  | 105 | 110 | 121 | 127 | 132 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 159 | 162 | 164 | 166 | 181 | 186 | -   | -   |     |   |
|                    | 50%        | -                 | -   | 14  | 21  | 27  | 36  | 43  | 49  | 53    | 67  | 75  | 82  | 95  | 103 | 109 | 121 | 127 | 133 | 138 | 143 | 147 | 151 | 155 | 158 | 161 | 163 | 166 | 182 | 188 | 195 | 200 | 206 | 211 | 215 | -   | -   |     |   |
|                    | 40%        | -                 | -   | 18  | 27  | 37  | 45  | 51  | 65  | 75    | 83  | 99  | 107 | 120 | 128 | 135 | 141 | 146 | 151 | 155 | 159 | 162 | 166 | 182 | 190 | 197 | 204 | 210 | 216 | 221 | 226 | 303 | 308 | 312 | 316 | -   | -   |     |   |
|                    | 30%        | -                 | -   | 26  | 38  | 48  | 61  | 75  | 91  | 103   | 113 | 129 | 137 | 144 | 151 | 156 | 161 | 165 | 183 | 193 | 202 | 210 | 217 | 224 | 302 | 308 | 313 | 318 | 322 | 326 | 330 | 334 | 337 | 341 | 344 | -   | -   |     |   |
|                    | 20%        | -                 | -   | 41  | 52  | 75  | 97  | 111 | 131 | 142   | 151 | 158 | 164 | 186 | 199 | 211 | 221 | 302 | 309 | 317 | 323 | 329 | 334 | 339 | 343 | 347 | 423 | 426 | 429 | 432 | 435 | 438 | 440 | 442 | 445 | -   | -   |     |   |
|                    | 10%        | -                 | -   | 82  | 121 | 143 | 158 | 182 | 206 | 224   | 311 | 323 | 333 | 341 | 421 | 427 | 433 | 437 | 442 | 446 | 449 | 452 | 455 | 458 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   | - |
| 20 kVA/<br>18 kW   | 100%       | -                 | -   | -   | 5   | 7   | 10  | 12  | 15  | 18    | 20  | 22  | 26  | 27  | 31  | 34  | 38  | 40  | 43  | 45  | 47  | 49  | 51  | 52  | 60  | 64  | 67  | 70  | 73  | 76  | 79  | 81  | 90  | 93  | -   | -   |     |     |   |
|                    | 90%        | -                 | -   | -   | 6   | 9   | 11  | 14  | 17  | 20    | 23  | 26  | 28  | 32  | 36  | 39  | 42  | 45  | 47  | 49  | 51  | 53  | 61  | 65  | 69  | 72  | 76  | 79  | 81  | 90  | 94  | 97  | 100 | 103 | -   | -   |     |     |   |
|                    | 80%        | -                 | -   | -   | 7   | 10  | 13  | 17  | 20  | 23    | 26  | 30  | 34  | 38  | 42  | 44  | 47  | 49  | 51  | 53  | 63  | 68  | 72  | 75  | 79  | 82  | 91  | 95  | 99  | 102 | 105 | 108 | 111 | 120 | -   | -   |     |     |   |
|                    | 70%        | -                 | -   | -   | 9   | 12  | 16  | 20  | 23  | 27    | 32  | 36  | 41  | 44  | 47  | 50  | 52  | 60  | 66  | 70  | 75  | 78  | 82  | 92  | 96  | 100 | 104 | 108 | 111 | 120 | 124 | 127 | 130 | 133 | -   | -   |     |     |   |
|                    | 60%        | -                 | -   | -   | 11  | 16  | 20  | 25  | 28  | 34    | 39  | 43  | 47  | 50  | 52  | 63  | 69  | 74  | 78  | 82  | 93  | 98  | 103 | 107 | 111 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | 147 | -   | -   |     |     |   |
|                    | 50%        | -                 | -   | -   | 14  | 19  | 25  | 30  | 37  | 42    | 46  | 50  | 53  | 65  | 72  | 77  | 82  | 94  | 100 | 105 | 110 | 120 | 125 | 130 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | 158 | 160 | -   | -   |     |     |   |
|                    | 40%        | -                 | -   | -   | 19  | 26  | 32  | 40  | 46  | 50    | 60  | 68  | 76  | 82  | 95  | 102 | 108 | 113 | 125 | 131 | 136 | 140 | 144 | 148 | 152 | 155 | 158 | 161 | 163 | 165 | 180 | 186 | 192 | 197 | -   | -   |     |     |   |
|                    | 30%        | -                 | -   | -   | 26  | 36  | 44  | 50  | 62  | 73    | 81  | 96  | 104 | 111 | 125 | 132 | 138 | 144 | 149 | 153 | 157 | 161 | 164 | 167 | 185 | 193 | 199 | 206 | 212 | 217 | 222 | 227 | 304 | 308 | -   | -   |     |     |   |
|                    | 20%        | -                 | -   | -   | 42  | 50  | 68  | 80  | 99  | 110</ |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 41 16-bay, single-phase, transformer-based unit Type F (&amp; UPS model number 9 = F)

| UPS Rating       | Load Level | # Battery Strings |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2  | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  |     |
| 5 kVA / 4.5 kW   | 100%       | -                 | 5  | 14  | 25  | 37  | 47  | 53  | 72  | 83  | 100 | 110 | 125 | 134 | 142 | 148 | 154 | 159 | 163 | 167 | 187 | 196 | 205 | 212 | 219 | 226 | 303 | 309 | 314 | 318 | 323 | 327 | 331 | 334 | 337 | 341 |     |
|                  | 90%        | -                 | 5  | 16  | 27  | 41  | 50  | 67  | 80  | 98  | 109 | 126 | 135 | 143 | 150 | 156 | 161 | 165 | 185 | 195 | 204 | 213 | 220 | 227 | 305 | 311 | 317 | 321 | 326 | 330 | 334 | 338 | 341 | 344 | 347 | 422 |     |
|                  | 80%        | -                 | 7  | 19  | 33  | 46  | 60  | 76  | 96  | 108 | 126 | 136 | 145 | 152 | 158 | 164 | 181 | 193 | 204 | 213 | 221 | 301 | 308 | 314 | 319 | 325 | 329 | 334 | 338 | 342 | 345 | 420 | 423 | 426 | 429 | 432 |     |
|                  | 70%        | -                 | 8  | 22  | 38  | 50  | 71  | 92  | 107 | 126 | 137 | 147 | 155 | 161 | 166 | 190 | 202 | 213 | 222 | 302 | 310 | 317 | 323 | 328 | 333 | 338 | 342 | 346 | 421 | 425 | 428 | 431 | 434 | 436 | 439 | 441 |     |
|                  | 60%        | -                 | 10 | 26  | 44  | 63  | 81  | 105 | 125 | 139 | 149 | 157 | 164 | 186 | 200 | 212 | 223 | 304 | 312 | 320 | 326 | 332 | 337 | 342 | 347 | 423 | 426 | 430 | 433 | 436 | 439 | 441 | 444 | 446 | 448 | 450 |     |
|                  | 50%        | -                 | 13 | 32  | 50  | 76  | 102 | 125 | 140 | 152 | 160 | 180 | 197 | 212 | 224 | 306 | 316 | 324 | 331 | 337 | 342 | 420 | 424 | 428 | 432 | 436 | 439 | 442 | 444 | 447 | 449 | 452 | 454 | 456 | 457 | 459 |     |
|                  | 40%        | -                 | 16 | 41  | 66  | 97  | 124 | 142 | 155 | 165 | 193 | 211 | 226 | 310 | 320 | 329 | 336 | 343 | 421 | 426 | 431 | 435 | 439 | 443 | 446 | 449 | 451 | 454 | 456 | 458 | 460 | 462 | 464 | 465 | 467 | 480 |     |
|                  | 30%        | -                 | 22 | 50  | 91  | 125 | 146 | 160 | 189 | 212 | 301 | 316 | 327 | 337 | 345 | 424 | 430 | 436 | 440 | 444 | 448 | 452 | 455 | 457 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 20%        | -                 | 34 | 79  | 129 | 155 | 187 | 218 | 312 | 328 | 341 | 423 | 432 | 439 | 445 | 450 | 454 | 458 | 461 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | -                 | 70 | 146 | 201 | 315 | 341 | 430 | 442 | 451 | 459 | 464 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA / 9 kW    | 100%       | -                 | -  | 5   | 10  | 15  | 20  | 26  | 31  | 38  | 43  | 47  | 51  | 60  | 67  | 74  | 79  | 90  | 96  | 102 | 107 | 112 | 122 | 127 | 132 | 136 | 140 | 143 | 147 | 150 | 152 | 155 | 158 | 160 | 162 | -   |     |
|                  | 90%        | -                 | -  | 6   | 11  | 17  | 22  | 28  | 36  | 42  | 47  | 51  | 61  | 69  | 75  | 81  | 93  | 100 | 106 | 111 | 122 | 127 | 132 | 137 | 141 | 145 | 148 | 151 | 154 | 157 | 160 | 162 | 164 | 166 | 182 | -   |     |
|                  | 80%        | -                 | -  | 7   | 13  | 19  | 26  | 34  | 41  | 47  | 51  | 62  | 71  | 78  | 90  | 98  | 104 | 110 | 122 | 128 | 134 | 138 | 143 | 147 | 151 | 154 | 157 | 160 | 163 | 165 | 167 | 185 | 191 | 197 | 202 | -   |     |
|                  | 70%        | -                 | -  | 9   | 16  | 23  | 31  | 40  | 47  | 51  | 65  | 74  | 81  | 95  | 103 | 110 | 122 | 129 | 135 | 141 | 145 | 150 | 154 | 157 | 160 | 163 | 166 | 183 | 190 | 196 | 202 | 208 | 213 | 218 | 223 | -   |     |
|                  | 60%        | -                 | -  | 11  | 19  | 27  | 38  | 46  | 52  | 67  | 77  | 92  | 101 | 109 | 123 | 131 | 137 | 143 | 148 | 153 | 157 | 161 | 164 | 167 | 187 | 195 | 202 | 208 | 214 | 220 | 225 | 302 | 307 | 311 | 315 | -   |     |
|                  | 50%        | -                 | -  | 14  | 25  | 36  | 46  | 52  | 70  | 81  | 98  | 108 | 123 | 132 | 139 | 146 | 152 | 157 | 161 | 165 | 182 | 192 | 200 | 208 | 215 | 222 | 300 | 305 | 310 | 315 | 320 | 324 | 328 | 331 | 335 | -   |     |
|                  | 40%        | -                 | -  | 18  | 30  | 44  | 52  | 73  | 91  | 105 | 121 | 132 | 141 | 149 | 155 | 161 | 165 | 186 | 197 | 206 | 215 | 223 | 302 | 308 | 314 | 320 | 325 | 329 | 333 | 337 | 341 | 344 | 420 | 423 | 425 | -   |     |
|                  | 30%        | -                 | -  | 25  | 42  | 53  | 77  | 100 | 120 | 134 | 144 | 153 | 160 | 166 | 191 | 204 | 215 | 225 | 305 | 313 | 320 | 326 | 332 | 337 | 341 | 346 | 422 | 425 | 428 | 432 | 434 | 437 | 440 | 442 | 444 | -   |     |
|                  | 20%        | -                 | -  | 38  | 61  | 91  | 112 | 137 | 150 | 161 | 182 | 201 | 217 | 302 | 312 | 322 | 330 | 337 | 343 | 421 | 426 | 430 | 434 | 438 | 441 | 445 | 447 | 450 | 452 | 455 | 457 | 459 | 461 | 462 | 464 | -   |     |
|                  | 10%        | -                 | -  | 75  | 124 | 151 | 167 | 210 | 305 | 322 | 336 | 347 | 427 | 435 | 441 | 446 | 451 | 455 | 458 | 462 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |
| 15 kVA / 13.5 kW | 100%       | -                 | -  | -   | 5   | 8   | 11  | 15  | 18  | 22  | 26  | 28  | 33  | 38  | 41  | 45  | 47  | 50  | 52  | 60  | 65  | 70  | 74  | 77  | 81  | 90  | 94  | 98  | 102 | 105 | 109 | 112 | 121 | 124 | 127 | -   |     |
|                  | 90%        | -                 | -  | -   | 6   | 9   | 13  | 17  | 21  | 25  | 28  | 34  | 38  | 42  | 46  | 48  | 51  | 53  | 64  | 69  | 74  | 78  | 81  | 91  | 96  | 100 | 104 | 108 | 111 | 120 | 124 | 128 | 131 | 134 | 137 | -   |     |
|                  | 80%        | -                 | -  | -   | 7   | 11  | 16  | 20  | 25  | 28  | 34  | 39  | 43  | 47  | 50  | 52  | 63  | 69  | 74  | 78  | 82  | 93  | 98  | 103 | 107 | 111 | 121 | 125 | 129 | 132 | 136 | 139 | 142 | 145 | 147 | -   |     |
|                  | 70%        | -                 | -  | -   | 9   | 13  | 18  | 23  | 28  | 35  | 40  | 45  | 49  | 52  | 62  | 69  | 74  | 79  | 90  | 96  | 101 | 106 | 111 | 121 | 126 | 130 | 134 | 138 | 141 | 145 | 148 | 150 | 153 | 155 | 158 | -   |     |
|                  | 60%        | -                 | -  | -   | 11  | 17  | 22  | 28  | 36  | 42  | 47  | 51  | 60  | 68  | 75  | 81  | 93  | 99  | 105 | 110 | 121 | 127 | 132 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 159 | 162 | 164 | 166 | 181 | -   |     |
|                  | 50%        | -                 | -  | -   | 14  | 21  | 27  | 36  | 43  | 49  | 53  | 67  | 75  | 82  | 95  | 103 | 109 | 121 | 127 | 133 | 138 | 143 | 147 | 151 | 155 | 158 | 161 | 163 | 166 | 182 | 188 | 195 | 200 | 206 | 211 | -   |     |
|                  | 40%        | -                 | -  | -   | 18  | 27  | 37  | 45  | 51  | 65  | 75  | 83  | 99  | 107 | 120 | 128 | 135 | 141 | 146 | 151 | 155 | 159 | 162 | 166 | 182 | 190 | 197 | 204 | 210 | 216 | 221 | 226 | 303 | 308 | 312 | -   |     |
|                  | 30%        | -                 | -  | -   | 26  | 38  | 48  | 61  | 75  | 91  | 103 | 113 | 129 | 137 | 144 | 151 | 156 | 161 | 165 | 183 | 193 | 202 | 210 | 217 | 224 | 302 | 308 | 313 | 318 | 322 | 326 | 330 | 334 | 337 | 341 | -   |     |
|                  | 20%        | -                 | -  | -   | 41  | 52  | 75  | 97  | 111 | 131 | 142 | 151 | 158 | 164 | 186 | 199 | 211 | 221 | 302 | 309 | 317 | 323 | 329 | 334 | 339 | 343 | 347 | 423 | 426 | 429 | 432 | 435 | 438 | 440 | 442 | -   |     |
|                  | 10%        | -                 | -  | -   | 82  | 121 | 143 | 158 | 182 | 206 | 224 | 311 | 323 | 333 | 341 | 421 | 427 | 433 | 437 | 442 | 446 | 449 | 452 | 455 | 458 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | -   |     |
| 20 kVA / 18 kW   | 100%       | -                 | -  | -   | -   | 5   | 7   | 10  | 12  | 15  | 18  | 20  | 22  | 26  | 27  | 31  | 34  | 38  | 40  | 43  | 45  | 47  | 49  | 51  | 52  | 60  | 64  | 67  | 70  | 73  | 76  | 79  | 81  | 90  | -   | -   |     |
|                  | 90%        | -                 | -  | -   | -   | 6   | 9   | 11  | 14  | 17  | 20  | 23  | 26  | 28  | 32  | 36  | 39  | 42  | 45  | 47  | 49  | 51  | 53  | 61  | 65  | 69  | 72  | 76  | 79  | 81  | 90  | 94  | 97  | 100 | -   |     |     |
|                  | 80%        | -                 | -  | -   | -   | 7   | 10  | 13  | 17  | 20  | 23  | 26  | 30  | 34  | 38  | 42  | 44  | 47  | 49  | 51  | 53  | 63  | 68  | 72  | 75  | 79  | 82  | 91  | 95  | 99  | 102 | 105 | 108 | 111 | -   | -   |     |
|                  | 70%        | -                 | -  | -   | -   | 9   | 12  | 16  | 20  | 23  | 27  | 32  | 36  | 41  | 44  | 47  | 50  | 52  | 60  | 66  | 70  | 75  | 78  | 82  | 92  | 96  | 100 | 104 | 108 | 111 | 120 | 124 | 127 | 130 | -   | -   |     |
|                  | 60%        | -                 | -  | -   | -   | 11  | 16  | 20  | 25  | 28  | 34  | 39  | 43  | 47  | 50  | 52  | 63  | 69  | 74  | 78  | 82  | 93  | 98  | 103 | 107 | 111 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | -   | -   |     |
|                  | 50%        | -                 | -  | -   | -   | 14  | 19  | 25  | 30  | 37  | 42  | 46  | 50  | 53  | 65  | 72  | 77  | 82  | 94  | 100 | 105 | 110 | 120 | 125 | 130 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | 158 | -   | -   |     |
|                  | 40%        | -                 | -  | -   | -   | 19  | 26  | 32  | 40  | 46  | 50  | 60  | 68  | 76  | 82  | 95  | 102 | 108 | 113 | 125 | 131 | 136 | 140 | 144 | 148 | 152 | 155 | 158 | 161 | 163 | 165 | 180 | 186 | 192 | -   | -   |     |
|                  | 30%        | -                 | -  | -   | -   | 26  | 36  | 44  | 50  | 62  | 73  | 81  | 96  | 104 | 111 | 125 | 132 | 138 | 144 | 149 | 153 | 157 | 161 | 164 | 167 | 185 | 193 | 199 | 206 | 212 | 217 | 222 | 227 | 304 | -   | -   |     |
|                  | 20%        | -                 | -  | -   | -   | 42  | 50  | 68  | 80  | 99  | 110 | 126 | 136 | 144 | 150 | 156 | 161 | 166 | 186 | 196 | 205 | 213 | 221 | 300 | 306 | 312 | 317 | 322 | 326 | 331 | 334 | 338 | 342 | 345 | -   | -   |     |
|                  | 10%        | -                 | -  | -   | -   | 90  | 111 | 136 | 149 | 160 | 180 | 199 | 215 | 300 | 311 | 320 | 328 | 336 | 342 | 420 | 425 | 429 | 433 | 437 | 440 | 444 | 446 | 449 | 452 | 454 | 456 | 458 | 460 | 462 | 464 | 466 | 468 |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



## 7.5 Estimated Battery Run Times

### 7.5.1 Tables for UPS Model Number Where Digits 1-4 are S5KE

**Table 42 10-bay, two-phase, no transformer unit Type N (& UPS model number 9 = N)**

| UPS Rating       | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  |     |     |
| 5 kVA / 4.5 kW   | 100%       | 5                 | 15  | 26  | 39  | 48  | 62  | 75  | 92  | 104 | 113 | 129 | 138 | 145 | 151 | 157 | 161 | 165 | 184 | 194 | 203 | 211 | 218 | 225 | 303 | 309 | 314 | 319 | 323 | 327 | 331 | 335 | 338 |     |     |
|                  | 90%        | 6                 | 18  | 28  | 43  | 52  | 71  | 83  | 103 | 113 | 130 | 139 | 147 | 154 | 159 | 164 | 182 | 193 | 203 | 212 | 220 | 227 | 305 | 311 | 317 | 322 | 327 | 331 | 335 | 339 | 342 | 346 | 421 |     |     |
|                  | 80%        | 7                 | 20  | 36  | 48  | 66  | 81  | 101 | 113 | 132 | 142 | 150 | 157 | 162 | 167 | 192 | 203 | 213 | 222 | 301 | 309 | 315 | 321 | 326 | 331 | 336 | 340 | 344 | 347 | 422 | 426 | 428 | 431 |     |     |
|                  | 70%        | 9                 | 25  | 42  | 53  | 77  | 99  | 113 | 133 | 144 | 153 | 160 | 166 | 190 | 203 | 214 | 224 | 305 | 312 | 319 | 325 | 331 | 336 | 341 | 345 | 421 | 425 | 428 | 431 | 434 | 437 | 439 | 442 |     |     |
|                  | 60%        | 11                | 28  | 48  | 71  | 96  | 113 | 135 | 147 | 156 | 164 | 187 | 203 | 216 | 227 | 308 | 317 | 324 | 331 | 337 | 342 | 347 | 423 | 427 | 431 | 434 | 438 | 440 | 443 | 446 | 448 | 450 | 452 |     |     |
|                  | 50%        | 15                | 38  | 61  | 91  | 112 | 137 | 150 | 161 | 182 | 201 | 217 | 302 | 313 | 322 | 330 | 337 | 343 | 421 | 426 | 430 | 434 | 438 | 442 | 445 | 447 | 450 | 452 | 455 | 457 | 459 | 461 | 462 |     |     |
|                  | 40%        | 20                | 47  | 79  | 111 | 139 | 155 | 166 | 199 | 218 | 305 | 318 | 328 | 337 | 345 | 423 | 429 | 434 | 439 | 443 | 446 | 450 | 453 | 455 | 458 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 |     |     |
|                  | 30%        | 27                | 67  | 109 | 143 | 161 | 195 | 220 | 311 | 326 | 337 | 347 | 427 | 434 | 440 | 445 | 449 | 453 | 457 | 460 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 20%        | 45                | 106 | 150 | 188 | 225 | 321 | 339 | 424 | 434 | 442 | 449 | 454 | 459 | 463 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | 101               | 167 | 314 | 347 | 438 | 451 | 460 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 100%       | -                 | 5   | 10  | 16  | 21  | 26  | 32  | 39  | 44  | 48  | 52  | 62  | 69  | 76  | 81  | 93  | 99  | 104 | 109 | 120 | 125 | 130 | 134 | 138 | 142 | 145 | 149 | 152 | 154 | 157 | 159 | 162 |     |     |
| 10 kVA / 9 kW    | 90%        | -                 | 6   | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 52  | 64  | 71  | 78  | 83  | 96  | 103 | 108 | 113 | 125 | 130 | 135 | 140 | 144 | 147 | 151 | 154 | 157 | 159 | 162 | 164 | 166 | 182 |     |     |
|                  | 80%        | -                 | 7   | 14  | 20  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 101 | 108 | 113 | 126 | 132 | 137 | 142 | 146 | 150 | 153 | 157 | 160 | 162 | 165 | 167 | 186 | 192 | 198 | 203 |     |     |
|                  | 70%        | -                 | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 68  | 77  | 91  | 100 | 107 | 120 | 127 | 134 | 139 | 144 | 149 | 153 | 157 | 160 | 163 | 166 | 183 | 191 | 197 | 204 | 209 | 215 | 220 | 225 |     |     |
|                  | 60%        | -                 | 12  | 21  | 30  | 41  | 48  | 60  | 72  | 81  | 97  | 106 | 120 | 128 | 136 | 142 | 148 | 153 | 157 | 161 | 164 | 180 | 189 | 197 | 204 | 211 | 217 | 222 | 300 | 305 | 309 | 314 | 318 |     |     |
|                  | 50%        | -                 | 15  | 26  | 39  | 48  | 62  | 75  | 92  | 104 | 113 | 130 | 138 | 145 | 151 | 157 | 161 | 166 | 185 | 195 | 203 | 211 | 219 | 225 | 303 | 309 | 314 | 319 | 323 | 328 | 331 | 335 | 338 |     |     |
|                  | 40%        | -                 | 20  | 35  | 48  | 65  | 80  | 101 | 113 | 131 | 141 | 149 | 156 | 162 | 167 | 191 | 202 | 212 | 221 | 301 | 308 | 314 | 320 | 326 | 330 | 335 | 339 | 343 | 347 | 422 | 425 | 428 | 431 |     |     |
|                  | 30%        | -                 | 28  | 47  | 69  | 94  | 111 | 133 | 145 | 155 | 162 | 183 | 199 | 212 | 223 | 305 | 314 | 322 | 328 | 334 | 340 | 345 | 421 | 425 | 429 | 433 | 436 | 439 | 441 | 444 | 446 | 449 | 451 |     |     |
|                  | 20%        | -                 | 46  | 76  | 108 | 136 | 152 | 164 | 193 | 213 | 301 | 314 | 325 | 334 | 342 | 420 | 426 | 432 | 436 | 440 | 444 | 448 | 451 | 453 | 456 | 458 | 461 | 463 | 465 | 466 | 480 | 480 | 480 |     |     |
|                  | 10%        | -                 | 104 | 148 | 184 | 222 | 319 | 336 | 422 | 432 | 441 | 447 | 453 | 458 | 462 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 100%       | -                 | -   | 5   | 8   | 11  | 15  | 18  | 22  | 26  | 28  | 35  | 39  | 42  | 45  | 48  | 50  | 53  | 62  | 67  | 71  | 75  | 79  | 82  | 92  | 97  | 101 | 104 | 107 | 111 | 113 | 123 | -   |     |     |
|                  | 90%        | -                 | -   | 6   | 10  | 14  | 18  | 21  | 26  | 28  | 35  | 40  | 43  | 47  | 49  | 52  | 61  | 67  | 71  | 76  | 80  | 83  | 94  | 99  | 103 | 107 | 110 | 113 | 123 | 127 | 131 | 134 | -   |     |     |
| 15 kVA / 13.5 kW | 80%        | -                 | -   | 8   | 12  | 16  | 21  | 26  | 30  | 36  | 41  | 45  | 48  | 51  | 60  | 66  | 72  | 77  | 81  | 92  | 97  | 102 | 106 | 110 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | -   |     |     |
|                  | 70%        | -                 | -   | 9   | 14  | 19  | 25  | 30  | 37  | 42  | 46  | 50  | 53  | 65  | 72  | 77  | 82  | 94  | 100 | 105 | 110 | 120 | 125 | 130 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | -   |     |     |
|                  | 60%        | -                 | -   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 104 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 165 | 167 | -   |     |     |
|                  | 50%        | -                 | -   | 16  | 22  | 30  | 39  | 46  | 51  | 62  | 72  | 79  | 93  | 101 | 108 | 120 | 127 | 133 | 138 | 143 | 148 | 152 | 155 | 159 | 162 | 165 | 167 | 185 | 192 | 198 | 204 | 209 | -   |     |     |
|                  | 40%        | -                 | -   | 20  | 28  | 40  | 48  | 53  | 71  | 80  | 96  | 105 | 113 | 128 | 135 | 141 | 147 | 152 | 156 | 160 | 164 | 167 | 187 | 195 | 203 | 209 | 216 | 221 | 227 | 304 | 308 | 313 | -   |     |     |
|                  | 30%        | -                 | -   | 28  | 43  | 51  | 70  | 82  | 101 | 112 | 129 | 138 | 146 | 152 | 158 | 163 | 167 | 190 | 200 | 209 | 217 | 224 | 303 | 309 | 315 | 320 | 325 | 329 | 333 | 337 | 341 | 344 | -   |     |     |
|                  | 20%        | -                 | -   | 46  | 67  | 92  | 109 | 131 | 143 | 153 | 161 | 167 | 195 | 209 | 220 | 302 | 311 | 319 | 326 | 332 | 338 | 343 | 347 | 423 | 427 | 431 | 434 | 437 | 440 | 443 | 445 | 447 | -   |     |     |
|                  | 10%        | -                 | -   | 106 | 140 | 158 | 188 | 214 | 306 | 321 | 333 | 343 | 424 | 431 | 437 | 442 | 447 | 451 | 454 | 458 | 460 | 463 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |     |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 43 10-bay, two-phase, no transformer unit Type R (&amp; UPS model number 9 = R)

| UPS Rating       | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  |     |     |
| 5 kVA / 4.5 kW   | 100%       | 5                 | 16  | 26  | 39  | 48  | 62  | 76  | 93  | 104 | 120 | 130 | 138 | 145 | 152 | 157 | 162 | 166 | 185 | 195 | 204 | 212 | 219 | 226 | 304 | 309 | 314 | 319 | 324 | 328 | 332 | 335 | 339 |     |     |
|                  | 90%        | 6                 | 18  | 28  | 43  | 52  | 71  | 83  | 102 | 113 | 130 | 139 | 147 | 154 | 159 | 164 | 181 | 193 | 203 | 211 | 219 | 227 | 305 | 311 | 317 | 322 | 327 | 331 | 335 | 339 | 342 | 345 | 420 |     |     |
|                  | 80%        | 7                 | 20  | 35  | 48  | 65  | 80  | 100 | 113 | 131 | 141 | 149 | 156 | 162 | 167 | 190 | 202 | 212 | 221 | 301 | 308 | 314 | 320 | 325 | 330 | 335 | 339 | 343 | 346 | 422 | 425 | 428 | 431 |     |     |
|                  | 70%        | 9                 | 25  | 41  | 52  | 76  | 98  | 112 | 132 | 143 | 152 | 159 | 165 | 188 | 201 | 212 | 222 | 303 | 311 | 318 | 324 | 330 | 335 | 340 | 344 | 420 | 424 | 427 | 430 | 433 | 436 | 438 | 441 |     |     |
|                  | 60%        | 11                | 28  | 47  | 69  | 94  | 111 | 133 | 145 | 155 | 163 | 183 | 199 | 212 | 224 | 306 | 314 | 322 | 329 | 335 | 340 | 345 | 421 | 426 | 429 | 433 | 436 | 439 | 442 | 444 | 447 | 449 | 451 |     |     |
|                  | 50%        | 14                | 37  | 53  | 83  | 110 | 134 | 148 | 159 | 167 | 196 | 212 | 226 | 309 | 318 | 327 | 334 | 340 | 346 | 423 | 428 | 432 | 436 | 439 | 443 | 445 | 448 | 451 | 453 | 455 | 457 | 459 | 461 |     |     |
|                  | 40%        | 19                | 46  | 76  | 108 | 136 | 152 | 163 | 192 | 212 | 300 | 313 | 324 | 333 | 341 | 420 | 426 | 431 | 436 | 440 | 444 | 447 | 450 | 453 | 456 | 458 | 460 | 462 | 464 | 466 | 480 | 480 | 480 |     |     |
|                  | 30%        | 26                | 62  | 104 | 138 | 157 | 185 | 212 | 304 | 319 | 332 | 342 | 422 | 429 | 436 | 441 | 446 | 450 | 453 | 457 | 460 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 20%        | 42                | 99  | 144 | 166 | 214 | 312 | 331 | 345 | 428 | 437 | 444 | 450 | 455 | 459 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | 91                | 160 | 301 | 337 | 430 | 444 | 455 | 462 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA/ 9 kW     | 100%       | -                 | 5   | 10  | 16  | 21  | 26  | 32  | 39  | 44  | 48  | 52  | 63  | 70  | 76  | 81  | 93  | 99  | 105 | 109 | 120 | 125 | 130 | 135 | 139 | 142 | 146 | 149 | 152 | 155 | 157 | 160 | -   |     |     |
|                  | 90%        | -                 | 6   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 103 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 165 | 167 | -   |     |     |
|                  | 80%        | -                 | 8   | 14  | 21  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 102 | 108 | 120 | 126 | 132 | 137 | 142 | 146 | 150 | 154 | 157 | 160 | 163 | 165 | 180 | 187 | 193 | 199 | -   |     |     |
|                  | 70%        | -                 | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 68  | 77  | 91  | 100 | 107 | 120 | 127 | 134 | 139 | 144 | 149 | 153 | 157 | 160 | 163 | 166 | 183 | 191 | 197 | 204 | 209 | 215 | 220 | -   |     |     |
|                  | 60%        | -                 | 11  | 20  | 28  | 40  | 48  | 53  | 71  | 80  | 96  | 105 | 113 | 128 | 135 | 141 | 147 | 152 | 156 | 160 | 164 | 167 | 187 | 195 | 203 | 209 | 216 | 221 | 227 | 304 | 308 | 313 | -   |     |     |
|                  | 50%        | -                 | 15  | 26  | 38  | 48  | 61  | 74  | 91  | 103 | 112 | 128 | 137 | 144 | 150 | 156 | 160 | 165 | 182 | 192 | 201 | 209 | 216 | 223 | 301 | 307 | 312 | 317 | 322 | 326 | 330 | 333 | -   |     |     |
|                  | 40%        | -                 | 20  | 34  | 47  | 63  | 78  | 98  | 111 | 129 | 139 | 147 | 154 | 160 | 165 | 186 | 198 | 208 | 217 | 225 | 305 | 311 | 317 | 323 | 328 | 332 | 337 | 341 | 344 | 420 | 423 | 426 | -   |     |     |
|                  | 30%        | -                 | 27  | 46  | 67  | 91  | 109 | 130 | 143 | 152 | 160 | 167 | 194 | 207 | 219 | 301 | 310 | 318 | 325 | 331 | 337 | 342 | 346 | 423 | 427 | 430 | 433 | 436 | 439 | 442 | 444 | 447 | -   |     |     |
|                  | 20%        | -                 | 44  | 73  | 105 | 133 | 149 | 161 | 187 | 207 | 224 | 309 | 320 | 330 | 338 | 345 | 423 | 429 | 433 | 438 | 442 | 445 | 448 | 451 | 454 | 456 | 459 | 461 | 463 | 465 | 466 | 480 | -   |     |     |
|                  | 10%        | -                 | 100 | 145 | 167 | 216 | 314 | 333 | 346 | 429 | 438 | 445 | 451 | 456 | 460 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |     |
| 15 kVA / 13.5 kW | 100%       | -                 | -   | 5   | 8   | 11  | 15  | 18  | 22  | 26  | 28  | 35  | 39  | 42  | 45  | 48  | 50  | 53  | 62  | 67  | 71  | 75  | 79  | 82  | 92  | 97  | 100 | 104 | 107 | 111 | 113 | 123 | -   |     |     |
|                  | 90%        | -                 | -   | 6   | 10  | 14  | 18  | 22  | 26  | 30  | 35  | 40  | 44  | 47  | 50  | 52  | 61  | 67  | 72  | 76  | 80  | 90  | 94  | 99  | 103 | 107 | 110 | 120 | 124 | 127 | 131 | 134 | -   |     |     |
|                  | 80%        | -                 | -   | 8   | 12  | 16  | 21  | 26  | 30  | 36  | 41  | 45  | 48  | 51  | 60  | 66  | 72  | 77  | 81  | 92  | 97  | 102 | 106 | 110 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | -   |     |     |
|                  | 70%        | -                 | -   | 9   | 14  | 19  | 25  | 30  | 37  | 42  | 46  | 50  | 53  | 65  | 72  | 77  | 82  | 94  | 100 | 105 | 110 | 120 | 125 | 130 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | -   |     |     |
|                  | 60%        | -                 | -   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 103 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 164 | 167 | -   |     |     |
|                  | 50%        | -                 | -   | 15  | 22  | 28  | 39  | 45  | 50  | 62  | 71  | 79  | 92  | 100 | 107 | 113 | 126 | 132 | 138 | 143 | 147 | 151 | 155 | 158 | 161 | 164 | 167 | 184 | 191 | 197 | 203 | 208 | -   |     |     |
|                  | 40%        | -                 | -   | 20  | 28  | 40  | 47  | 53  | 70  | 79  | 95  | 104 | 112 | 126 | 134 | 140 | 146 | 151 | 155 | 159 | 163 | 166 | 185 | 193 | 200 | 207 | 214 | 219 | 225 | 302 | 307 | 311 | -   |     |     |
|                  | 30%        | -                 | -   | 28  | 42  | 50  | 68  | 80  | 99  | 110 | 126 | 136 | 144 | 151 | 156 | 161 | 166 | 186 | 196 | 205 | 214 | 221 | 300 | 306 | 312 | 317 | 322 | 327 | 331 | 335 | 338 | 342 | -   |     |     |
|                  | 20%        | -                 | -   | 45  | 65  | 83  | 107 | 128 | 141 | 151 | 159 | 165 | 190 | 204 | 216 | 226 | 307 | 315 | 322 | 329 | 334 | 340 | 344 | 421 | 425 | 428 | 432 | 435 | 438 | 440 | 443 | 445 | -   |     |     |
|                  | 10%        | -                 | -   | 102 | 136 | 155 | 180 | 207 | 300 | 316 | 329 | 339 | 420 | 427 | 433 | 439 | 444 | 448 | 452 | 455 | 458 | 461 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |     |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 44 10-bay, two-phase, no transformer unit Type F (&amp; UPS model number 9 = F)

| UPS Rating     | Load Level | # Battery Strings |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------------|------------|-------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                |            | 1                 | 2  | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  |     |
| 5 kVA / 4.5 kW | 100%       | -                 | 5  | 16  | 26  | 39  | 48  | 62  | 76  | 93  | 104 | 120 | 130 | 138 | 145 | 152 | 157 | 162 | 166 | 185 | 195 | 204 | 212 | 219 | 226 | 304 | 309 | 314 | 319 | 324 | 328 | 332 | 335 |     |
|                | 90%        | -                 | 6  | 18  | 28  | 43  | 52  | 71  | 83  | 102 | 113 | 130 | 139 | 147 | 154 | 159 | 164 | 181 | 193 | 203 | 211 | 219 | 227 | 305 | 311 | 317 | 322 | 327 | 331 | 335 | 339 | 342 | 345 |     |
|                | 80%        | -                 | 7  | 20  | 35  | 48  | 65  | 80  | 100 | 113 | 131 | 141 | 149 | 156 | 162 | 167 | 190 | 202 | 212 | 221 | 301 | 308 | 314 | 320 | 325 | 330 | 335 | 339 | 343 | 346 | 422 | 425 | 428 |     |
|                | 70%        | -                 | 9  | 25  | 41  | 52  | 76  | 98  | 112 | 132 | 143 | 152 | 159 | 165 | 188 | 201 | 212 | 222 | 303 | 311 | 318 | 324 | 330 | 335 | 340 | 344 | 420 | 424 | 427 | 430 | 433 | 436 | 438 |     |
|                | 60%        | -                 | 11 | 28  | 47  | 69  | 94  | 111 | 133 | 145 | 155 | 163 | 183 | 199 | 212 | 224 | 306 | 314 | 322 | 329 | 335 | 340 | 345 | 421 | 426 | 429 | 433 | 436 | 439 | 442 | 444 | 447 | 449 |     |
|                | 50%        | -                 | 14 | 37  | 53  | 83  | 110 | 134 | 148 | 159 | 167 | 196 | 212 | 226 | 309 | 318 | 327 | 334 | 340 | 346 | 423 | 428 | 432 | 436 | 439 | 443 | 445 | 448 | 451 | 453 | 455 | 457 | 459 |     |
|                | 40%        | -                 | 19 | 46  | 76  | 108 | 136 | 152 | 163 | 192 | 212 | 300 | 313 | 324 | 333 | 341 | 420 | 426 | 431 | 436 | 440 | 444 | 447 | 450 | 453 | 456 | 458 | 460 | 462 | 464 | 466 | 480 | 480 |     |
|                | 30%        | -                 | 26 | 62  | 104 | 138 | 157 | 185 | 212 | 304 | 319 | 332 | 342 | 422 | 429 | 436 | 441 | 446 | 450 | 453 | 457 | 460 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                | 20%        | -                 | 42 | 99  | 144 | 166 | 214 | 312 | 331 | 345 | 428 | 437 | 444 | 450 | 455 | 459 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                | 10%        | -                 | 91 | 160 | 301 | 337 | 430 | 444 | 455 | 462 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10 kVA / 9 kW  | 100%       | -                 | -  | 5   | 10  | 16  | 21  | 26  | 32  | 39  | 44  | 48  | 52  | 63  | 70  | 76  | 81  | 93  | 99  | 105 | 109 | 120 | 125 | 130 | 135 | 139 | 142 | 146 | 149 | 152 | 155 | 157 | -   |     |
|                | 90%        | -                 | -  | 6   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 103 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 165 | -   |     |
|                | 80%        | -                 | -  | 8   | 14  | 21  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 102 | 108 | 120 | 126 | 132 | 137 | 142 | 146 | 150 | 154 | 157 | 160 | 163 | 165 | 180 | 187 | 193 | -   |     |
|                | 70%        | -                 | -  | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 68  | 77  | 91  | 100 | 107 | 120 | 127 | 134 | 139 | 144 | 149 | 153 | 157 | 160 | 163 | 166 | 183 | 191 | 197 | 204 | 209 | 215 | -   |     |
|                | 60%        | -                 | -  | 11  | 20  | 28  | 40  | 48  | 53  | 71  | 80  | 96  | 105 | 113 | 128 | 135 | 141 | 147 | 152 | 156 | 160 | 164 | 167 | 187 | 195 | 203 | 209 | 216 | 221 | 227 | 304 | 308 | -   |     |
|                | 50%        | -                 | -  | 15  | 26  | 38  | 48  | 61  | 74  | 91  | 103 | 112 | 128 | 137 | 144 | 150 | 156 | 160 | 165 | 182 | 192 | 201 | 209 | 216 | 223 | 301 | 307 | 312 | 317 | 322 | 326 | 330 | -   |     |
|                | 40%        | -                 | -  | 20  | 34  | 47  | 63  | 78  | 98  | 111 | 129 | 139 | 147 | 154 | 160 | 165 | 186 | 198 | 208 | 217 | 225 | 305 | 311 | 317 | 323 | 328 | 332 | 337 | 341 | 344 | 420 | 423 | -   |     |
|                | 30%        | -                 | -  | 27  | 46  | 67  | 91  | 109 | 130 | 143 | 152 | 160 | 167 | 194 | 207 | 219 | 301 | 310 | 318 | 325 | 331 | 337 | 342 | 346 | 423 | 427 | 430 | 433 | 436 | 439 | 442 | 444 | -   |     |
|                | 20%        | -                 | -  | 44  | 73  | 105 | 133 | 149 | 161 | 187 | 207 | 224 | 309 | 320 | 330 | 338 | 345 | 423 | 429 | 433 | 438 | 442 | 445 | 448 | 451 | 454 | 456 | 459 | 461 | 463 | 465 | 466 | -   |     |
|                | 10%        | -                 | -  | 100 | 145 | 167 | 216 | 314 | 333 | 346 | 429 | 438 | 445 | 451 | 456 | 460 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



## 7.6 Estimated Battery Run Times

### 7.6.1 Tables for UPS Model Number Where Digits 1-4 are S5KF

**Table 45 16-bay, two-phase, no transformer, unit Type N (& UPS model number 9 = N)**

| UPS Rating       | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  |     |
| 5kVA/<br>4.5kW   | 100%       | 5                 | 15  | 26  | 39  | 48  | 62  | 75  | 92  | 104 | 113 | 129 | 138 | 145 | 151 | 157 | 161 | 165 | 184 | 194 | 203 | 211 | 218 | 225 | 303 | 309 | 314 | 319 | 323 | 327 | 331 | 335 | 338 | 341 | 344 | 347 |     |
|                  | 90%        | 6                 | 18  | 28  | 43  | 52  | 71  | 83  | 103 | 113 | 130 | 139 | 147 | 154 | 159 | 164 | 182 | 193 | 203 | 212 | 220 | 227 | 305 | 311 | 317 | 322 | 327 | 331 | 335 | 339 | 342 | 346 | 421 | 423 | 426 | 429 |     |
|                  | 80%        | 7                 | 20  | 36  | 48  | 66  | 81  | 101 | 113 | 132 | 142 | 150 | 157 | 162 | 167 | 192 | 203 | 213 | 222 | 301 | 309 | 315 | 321 | 326 | 331 | 336 | 340 | 344 | 347 | 422 | 426 | 428 | 431 | 434 | 436 | 438 |     |
|                  | 70%        | 9                 | 25  | 42  | 53  | 77  | 99  | 113 | 133 | 144 | 153 | 160 | 166 | 190 | 203 | 214 | 224 | 305 | 312 | 319 | 325 | 331 | 336 | 341 | 345 | 421 | 425 | 428 | 431 | 434 | 437 | 439 | 442 | 444 | 446 | 448 |     |
|                  | 60%        | 11                | 28  | 48  | 71  | 96  | 113 | 135 | 147 | 156 | 164 | 187 | 203 | 216 | 227 | 308 | 317 | 324 | 331 | 337 | 342 | 347 | 423 | 427 | 431 | 434 | 438 | 440 | 443 | 446 | 448 | 450 | 452 | 454 | 456 | 458 |     |
|                  | 50%        | 15                | 38  | 61  | 91  | 112 | 137 | 150 | 161 | 182 | 201 | 217 | 302 | 313 | 322 | 330 | 337 | 343 | 421 | 426 | 430 | 434 | 438 | 442 | 445 | 447 | 450 | 452 | 455 | 457 | 459 | 461 | 462 | 464 | 465 | 467 |     |
|                  | 40%        | 20                | 47  | 79  | 111 | 139 | 155 | 166 | 199 | 218 | 305 | 318 | 328 | 337 | 345 | 423 | 429 | 434 | 439 | 443 | 446 | 450 | 453 | 455 | 458 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 30%        | 27                | 67  | 109 | 143 | 161 | 195 | 220 | 311 | 326 | 337 | 347 | 427 | 434 | 440 | 445 | 449 | 453 | 457 | 460 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 20%        | 45                | 106 | 150 | 188 | 225 | 321 | 339 | 424 | 434 | 442 | 449 | 454 | 459 | 463 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | 101               | 167 | 314 | 347 | 438 | 451 | 460 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10kVA/<br>9kW    | 100%       | -                 | 5   | 10  | 16  | 21  | 26  | 32  | 39  | 44  | 48  | 52  | 62  | 69  | 76  | 81  | 93  | 99  | 104 | 109 | 120 | 125 | 130 | 134 | 138 | 142 | 145 | 149 | 152 | 154 | 157 | 159 | 162 | 164 | 166 | 180 |     |
|                  | 90%        | -                 | 6   | 11  | 18  | 23  | 28  | 37  | 43  | 48  | 52  | 64  | 71  | 78  | 83  | 96  | 103 | 108 | 113 | 125 | 130 | 135 | 140 | 144 | 147 | 151 | 154 | 157 | 159 | 162 | 164 | 166 | 182 | 188 | 193 | 198 |     |
|                  | 80%        | -                 | 7   | 14  | 20  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 101 | 108 | 113 | 126 | 132 | 137 | 142 | 146 | 150 | 153 | 157 | 160 | 162 | 165 | 167 | 186 | 192 | 198 | 203 | 208 | 213 | 218 |     |
|                  | 70%        | -                 | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 68  | 77  | 91  | 100 | 107 | 120 | 127 | 134 | 139 | 144 | 149 | 153 | 157 | 160 | 163 | 166 | 183 | 191 | 197 | 204 | 209 | 215 | 220 | 225 | 301 | 305 | 309 |     |
|                  | 60%        | -                 | 12  | 21  | 30  | 41  | 48  | 60  | 72  | 81  | 97  | 106 | 120 | 128 | 136 | 142 | 148 | 153 | 157 | 161 | 164 | 180 | 189 | 197 | 204 | 211 | 217 | 222 | 300 | 305 | 309 | 314 | 318 | 322 | 325 | 329 |     |
|                  | 50%        | -                 | 15  | 26  | 39  | 48  | 62  | 75  | 92  | 104 | 113 | 130 | 138 | 145 | 151 | 157 | 161 | 166 | 185 | 195 | 203 | 211 | 219 | 225 | 303 | 309 | 314 | 319 | 323 | 328 | 331 | 335 | 338 | 342 | 345 | 347 |     |
|                  | 40%        | -                 | 20  | 35  | 48  | 65  | 80  | 101 | 113 | 131 | 141 | 149 | 156 | 162 | 167 | 191 | 202 | 212 | 221 | 301 | 308 | 314 | 320 | 326 | 330 | 335 | 339 | 343 | 347 | 422 | 425 | 428 | 431 | 433 | 436 | 438 |     |
|                  | 30%        | -                 | 28  | 47  | 69  | 94  | 111 | 133 | 145 | 155 | 162 | 183 | 199 | 212 | 223 | 305 | 314 | 322 | 328 | 334 | 340 | 345 | 421 | 425 | 429 | 433 | 436 | 439 | 441 | 444 | 446 | 449 | 451 | 453 | 455 | 456 |     |
|                  | 20%        | -                 | 46  | 76  | 108 | 136 | 152 | 164 | 193 | 213 | 301 | 314 | 325 | 334 | 342 | 420 | 426 | 432 | 436 | 440 | 444 | 448 | 451 | 453 | 456 | 458 | 461 | 463 | 465 | 466 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 10%        | -                 | 104 | 148 | 184 | 222 | 319 | 336 | 422 | 432 | 441 | 447 | 453 | 458 | 462 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 15kVA/<br>13.5kW | 100%       | -                 | -   | 5   | 8   | 11  | 15  | 18  | 22  | 26  | 28  | 35  | 39  | 42  | 45  | 48  | 50  | 53  | 62  | 67  | 71  | 75  | 79  | 82  | 92  | 97  | 101 | 104 | 107 | 111 | 113 | 123 | 126 | 130 | 133 | -   |     |
|                  | 90%        | -                 | -   | 6   | 10  | 14  | 18  | 21  | 26  | 28  | 35  | 40  | 43  | 47  | 49  | 52  | 61  | 67  | 71  | 76  | 80  | 83  | 94  | 99  | 103 | 107 | 110 | 113 | 123 | 127 | 131 | 134 | 140 | 143 | 145 | -   |     |
|                  | 80%        | -                 | -   | 8   | 12  | 16  | 21  | 26  | 30  | 36  | 41  | 45  | 48  | 51  | 60  | 66  | 72  | 77  | 81  | 92  | 97  | 102 | 106 | 110 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | 148 | 150 | 153 | -   |     |
|                  | 70%        | -                 | -   | 9   | 14  | 19  | 25  | 30  | 37  | 42  | 46  | 50  | 53  | 65  | 72  | 77  | 82  | 94  | 100 | 105 | 110 | 120 | 125 | 130 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | 158 | 161 | 163 | -   |     |
|                  | 60%        | -                 | -   | 12  | 18  | 23  | 30  | 38  | 44  | 52  | 64  | 72  | 78  | 90  | 97  | 104 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 165 | 167 | 184 | 189 | 195 | -   |     |     |
|                  | 50%        | -                 | -   | 16  | 22  | 30  | 39  | 46  | 51  | 62  | 72  | 79  | 93  | 101 | 108 | 120 | 127 | 133 | 138 | 143 | 148 | 152 | 155 | 159 | 162 | 165 | 167 | 185 | 192 | 198 | 204 | 209 | 215 | 219 | 224 | -   |     |
|                  | 40%        | -                 | -   | 20  | 28  | 40  | 48  | 53  | 71  | 80  | 96  | 105 | 113 | 128 | 135 | 141 | 147 | 152 | 156 | 160 | 164 | 167 | 187 | 195 | 203 | 209 | 216 | 221 | 227 | 304 | 308 | 313 | 317 | 321 | 324 | -   |     |
|                  | 30%        | -                 | -   | 28  | 43  | 51  | 70  | 82  | 101 | 112 | 129 | 138 | 146 | 152 | 158 | 163 | 167 | 190 | 200 | 209 | 217 | 224 | 303 | 309 | 315 | 320 | 325 | 329 | 333 | 337 | 341 | 344 | 347 | 422 | 425 | -   |     |
|                  | 20%        | -                 | -   | 46  | 67  | 92  | 109 | 131 | 143 | 153 | 161 | 167 | 195 | 209 | 220 | 302 | 311 | 319 | 326 | 332 | 338 | 343 | 347 | 423 | 427 | 431 | 434 | 437 | 440 | 443 | 445 | 447 | 449 | 451 | 453 | -   |     |
|                  | 10%        | -                 | -   | 106 | 140 | 158 | 188 | 214 | 306 | 321 | 333 | 343 | 424 | 431 | 437 | 442 | 447 | 451 | 454 | 458 | 460 | 463 | 465 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
| 20kVA/<br>18kW   | 100%       | -                 | -   | -   | 5   | 7   | 10  | 12  | 15  | 18  | 20  | 23  | 26  | 28  | 31  | 35  | 38  | 41  | 43  | 46  | 48  | 49  | 51  | 53  | 61  | 65  | 68  | 71  | 74  | 77  | 80  | 82  | 91  | 94  | 97  | -   |     |
|                  | 90%        | -                 | -   | -   | 6   | 9   | 11  | 14  | 18  | 20  | 23  | 26  | 28  | 33  | 37  | 40  | 43  | 45  | 48  | 50  | 51  | 53  | 63  | 67  | 70  | 74  | 77  | 80  | 82  | 92  | 95  | 99  | 102 | 105 | 107 | -   |     |
|                  | 80%        | -                 | -   | -   | 7   | 10  | 14  | 17  | 20  | 23  | 27  | 31  | 35  | 39  | 42  | 45  | 48  | 50  | 52  | 60  | 65  | 69  | 73  | 77  | 80  | 83  | 93  | 97  | 101 | 104 | 107 | 110 | 113 | 122 | 125 | -   |     |
|                  | 70%        | -                 | -   | -   | 9   | 13  | 17  | 20  | 25  | 28  | 33  | 38  | 42  | 45  | 48  | 51  | 53  | 63  | 68  | 73  | 77  | 81  | 90  | 95  | 99  | 103 | 107 | 110 | 113 | 123 | 127 | 130 | 133 | 136 | 139 | -   |     |
|                  | 60%        | -                 | -   | -   | 12  | 16  | 21  | 26  | 30  | 36  | 41  | 45  | 48  | 51  | 60  | 66  | 72  | 77  | 81  | 92  | 97  | 102 | 106 | 110 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | 148 | 150 | 153 | -   |     |
|                  | 50%        | -                 | -   | -   | 16  | 21  | 26  | 32  | 39  | 44  | 48  | 52  | 63  | 70  | 76  | 81  | 93  | 99  | 105 | 110 | 120 | 125 | 130 | 135 | 139 | 142 | 146 | 149 | 152 | 155 | 157 | 160 | 162 | 164 | 166 | -   |     |
|                  | 40%        | -                 | -   | -   | 21  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 102 | 108 | 120 | 126 | 132 | 137 | 142 | 146 | 150 | 154 | 157 | 160 | 163 | 165 | 180 | 186 | 192 | 198 | 204 | 209 | 214 | -   |     |
|                  | 30%        | -                 | -   | -   | 28  | 40  | 48  | 53  | 70  | 80  | 95  | 105 | 112 | 127 | 134 | 141 | 146 | 151 | 156 | 160 | 163 | 167 | 186 | 194 | 201 | 208 | 214 | 220 | 225 | 302 | 307 | 312 | 316 | 320 | 323 | -   |     |
|                  | 20%        | -                 | -   | -   | 46  | 62  | 77  | 97  | 110 | 127 | 138 | 146 | 153 | 159 | 165 | 184 | 196 | 206 | 215 | 223 | 303 | 310 | 316 | 321 |     |     |     |     |     |     |     |     |     |     |     |     |     |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 46 16-bay, two-phase, no transformer unit Type R (&amp; UPS model number 9 = R)

| UPS Rating       | Load Level | # Battery Strings |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  |     |
| 5kVA/<br>4.5kW   | 100%       | 5                 | 16  | 26  | 39  | 48  | 62  | 76  | 93  | 104 | 120 | 130 | 138 | 145 | 152 | 157 | 162 | 166 | 185 | 195 | 204 | 212 | 219 | 226 | 304 | 309 | 314 | 319 | 324 | 328 | 332 | 335 | 339 | 342 | 345 | 420 |     |
|                  | 90%        | 6                 | 18  | 28  | 43  | 52  | 71  | 83  | 102 | 113 | 130 | 139 | 147 | 154 | 159 | 164 | 181 | 193 | 203 | 211 | 219 | 227 | 305 | 311 | 317 | 322 | 327 | 331 | 335 | 339 | 342 | 345 | 420 | 423 | 426 | 429 |     |
|                  | 80%        | 7                 | 20  | 35  | 48  | 65  | 80  | 100 | 113 | 131 | 141 | 149 | 156 | 162 | 167 | 190 | 202 | 212 | 221 | 301 | 308 | 314 | 320 | 325 | 330 | 335 | 339 | 343 | 346 | 422 | 425 | 428 | 431 | 433 | 436 | 438 |     |
|                  | 70%        | 9                 | 25  | 41  | 52  | 76  | 98  | 112 | 132 | 143 | 152 | 159 | 165 | 188 | 201 | 212 | 222 | 303 | 311 | 318 | 324 | 330 | 335 | 340 | 344 | 420 | 424 | 427 | 430 | 433 | 436 | 438 | 441 | 443 | 445 | 447 |     |
|                  | 60%        | 11                | 28  | 47  | 69  | 94  | 111 | 133 | 145 | 155 | 163 | 183 | 199 | 212 | 224 | 306 | 314 | 322 | 329 | 335 | 340 | 345 | 421 | 426 | 429 | 433 | 436 | 439 | 442 | 444 | 447 | 449 | 451 | 453 | 455 | 456 |     |
|                  | 50%        | 14                | 37  | 53  | 83  | 110 | 134 | 148 | 159 | 167 | 196 | 212 | 226 | 309 | 318 | 327 | 334 | 340 | 346 | 423 | 428 | 432 | 436 | 439 | 443 | 445 | 448 | 451 | 453 | 455 | 457 | 459 | 461 | 462 | 464 | 465 |     |
|                  | 40%        | 19                | 46  | 76  | 108 | 136 | 152 | 163 | 192 | 212 | 300 | 313 | 324 | 333 | 341 | 420 | 426 | 431 | 436 | 440 | 444 | 447 | 450 | 453 | 456 | 458 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 30%        | 26                | 62  | 104 | 138 | 157 | 185 | 212 | 304 | 319 | 332 | 342 | 422 | 429 | 436 | 441 | 446 | 450 | 453 | 457 | 460 | 462 | 465 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 20%        | 42                | 99  | 144 | 166 | 214 | 312 | 331 | 345 | 428 | 437 | 444 | 450 | 455 | 459 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | 91                | 160 | 301 | 337 | 430 | 444 | 455 | 462 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10kVA/<br>9kW    | 100%       | -                 | 5   | 10  | 16  | 21  | 26  | 32  | 39  | 44  | 48  | 52  | 63  | 70  | 76  | 81  | 93  | 99  | 105 | 109 | 120 | 125 | 130 | 135 | 139 | 142 | 146 | 149 | 152 | 155 | 157 | 160 | 162 | 164 | 166 | 180 |     |
|                  | 90%        | -                 | 6   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 103 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 165 | 167 | 183 | 189 | 194 | 199 |     |
|                  | 80%        | -                 | 8   | 14  | 21  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 102 | 108 | 120 | 126 | 132 | 137 | 142 | 146 | 150 | 154 | 157 | 160 | 163 | 166 | 180 | 187 | 193 | 199 | 204 | 209 | 214 | 218 |     |
|                  | 70%        | -                 | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 68  | 77  | 91  | 100 | 107 | 120 | 127 | 134 | 139 | 144 | 149 | 153 | 157 | 160 | 163 | 166 | 183 | 191 | 197 | 204 | 209 | 215 | 220 | 225 | 301 | 305 | 309 |     |
|                  | 60%        | -                 | 11  | 20  | 28  | 40  | 48  | 53  | 71  | 80  | 96  | 105 | 113 | 128 | 135 | 141 | 147 | 152 | 156 | 160 | 164 | 167 | 187 | 195 | 203 | 209 | 216 | 221 | 227 | 304 | 308 | 313 | 317 | 321 | 324 | 328 |     |
|                  | 50%        | -                 | 15  | 26  | 38  | 48  | 61  | 74  | 91  | 103 | 112 | 128 | 137 | 144 | 150 | 156 | 160 | 165 | 182 | 192 | 201 | 209 | 216 | 223 | 301 | 307 | 312 | 317 | 322 | 326 | 330 | 333 | 337 | 340 | 343 | 346 |     |
|                  | 40%        | -                 | 20  | 34  | 47  | 63  | 78  | 98  | 111 | 129 | 139 | 147 | 154 | 160 | 165 | 186 | 198 | 208 | 217 | 225 | 305 | 311 | 317 | 323 | 328 | 332 | 337 | 341 | 344 | 420 | 423 | 426 | 429 | 431 | 434 | 436 |     |
|                  | 30%        | -                 | 27  | 46  | 67  | 91  | 109 | 130 | 143 | 152 | 160 | 167 | 194 | 207 | 219 | 301 | 310 | 318 | 325 | 331 | 337 | 342 | 346 | 423 | 427 | 430 | 433 | 436 | 439 | 442 | 444 | 447 | 449 | 451 | 453 | 454 |     |
|                  | 20%        | -                 | 44  | 73  | 105 | 133 | 149 | 161 | 187 | 207 | 224 | 309 | 320 | 330 | 338 | 345 | 423 | 429 | 433 | 438 | 442 | 445 | 448 | 451 | 454 | 456 | 459 | 461 | 463 | 465 | 466 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 10%        | -                 | 100 | 145 | 167 | 216 | 314 | 333 | 346 | 429 | 438 | 445 | 451 | 456 | 460 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 15kVA/<br>13.5kW | 100%       | -                 | 5   | 8   | 11  | 15  | 18  | 22  | 26  | 30  | 35  | 40  | 44  | 47  | 50  | 52  | 61  | 67  | 72  | 76  | 80  | 90  | 94  | 99  | 103 | 107 | 110 | 120 | 124 | 127 | 131 | 134 | 137 | 140 | 143 | -   |     |
|                  | 90%        | -                 | 6   | 10  | 14  | 18  | 22  | 26  | 30  | 35  | 40  | 44  | 47  | 50  | 52  | 61  | 67  | 72  | 76  | 80  | 90  | 94  | 99  | 103 | 107 | 110 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | 148 | 150 | 153 |
|                  | 80%        | -                 | 8   | 12  | 16  | 21  | 26  | 30  | 36  | 41  | 45  | 48  | 51  | 60  | 66  | 72  | 77  | 81  | 92  | 97  | 102 | 106 | 110 | 120 | 125 | 130 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | 158 | 161 | 163 |
|                  | 70%        | -                 | 9   | 14  | 19  | 25  | 30  | 37  | 42  | 46  | 50  | 53  | 65  | 72  | 77  | 82  | 94  | 100 | 105 | 110 | 120 | 125 | 130 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | 158 | 161 | 163 | -   | -   |     |
|                  | 60%        | -                 | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 103 | 109 | 120 | 126 | 131 | 136 | 140 | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 164 | 167 | 183 | 189 | 194 | -   | -   |     |
|                  | 50%        | -                 | 15  | 22  | 28  | 39  | 45  | 50  | 62  | 71  | 95  | 104 | 112 | 126 | 134 | 140 | 146 | 151 | 155 | 159 | 163 | 166 | 185 | 193 | 200 | 207 | 214 | 219 | 225 | 302 | 307 | 311 | 315 | 319 | 323 | -   |     |
|                  | 40%        | -                 | 20  | 28  | 40  | 47  | 53  | 70  | 79  | 95  | 104 | 112 | 126 | 134 | 140 | 146 | 151 | 155 | 159 | 163 | 166 | 185 | 193 | 200 | 207 | 214 | 219 | 225 | 302 | 307 | 311 | 315 | 319 | 323 | -   |     |     |
|                  | 30%        | -                 | 28  | 42  | 50  | 68  | 80  | 99  | 110 | 126 | 136 | 144 | 151 | 156 | 161 | 166 | 186 | 196 | 205 | 214 | 221 | 300 | 306 | 312 | 317 | 322 | 327 | 331 | 335 | 338 | 342 | 345 | 420 | 423 | -   | -   |     |
|                  | 20%        | -                 | 45  | 65  | 83  | 107 | 128 | 141 | 151 | 159 | 165 | 190 | 204 | 216 | 226 | 307 | 315 | 322 | 329 | 334 | 340 | 344 | 421 | 425 | 428 | 432 | 435 | 438 | 440 | 443 | 445 | 447 | 449 | 451 | -   | -   |     |
|                  | 10%        | -                 | 102 | 136 | 155 | 180 | 207 | 300 | 316 | 329 | 339 | 420 | 427 | 433 | 439 | 444 | 448 | 452 | 455 | 458 | 461 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   | -   |
| 20kVA/<br>18kW   | 100%       | -                 | -   | 5   | 7   | 10  | 12  | 15  | 18  | 20  | 23  | 26  | 28  | 32  | 35  | 38  | 41  | 44  | 46  | 48  | 50  | 52  | 53  | 61  | 65  | 69  | 72  | 75  | 78  | 80  | 83  | 92  | 95  | -   | -   |     |     |
|                  | 90%        | -                 | -   | 6   | 9   | 11  | 14  | 18  | 20  | 23  | 26  | 28  | 33  | 37  | 40  | 43  | 45  | 48  | 50  | 51  | 53  | 63  | 67  | 70  | 74  | 77  | 80  | 83  | 92  | 95  | 99  | 102 | 105 | -   | -   |     |     |
|                  | 80%        | -                 | -   | 7   | 10  | 14  | 17  | 20  | 23  | 27  | 31  | 35  | 39  | 42  | 45  | 48  | 50  | 52  | 60  | 65  | 69  | 73  | 77  | 80  | 83  | 93  | 97  | 100 | 104 | 107 | 110 | 113 | 122 | -   | -   |     |     |
|                  | 70%        | -                 | -   | 9   | 13  | 17  | 20  | 25  | 28  | 33  | 38  | 42  | 45  | 48  | 50  | 53  | 63  | 68  | 73  | 77  | 80  | 90  | 95  | 99  | 103 | 107 | 110 | 113 | 123 | 126 | 130 | 133 | 136 | -   | -   |     |     |
|                  | 60%        | -                 | -   | 11  | 16  | 20  | 25  | 28  | 36  | 41  | 45  | 48  | 51  | 53  | 66  | 71  | 76  | 81  | 91  | 97  | 101 | 106 | 110 | 113 | 124 | 128 | 132 | 135 | 139 | 142 | 145 | 147 | 150 | -   | -   |     |     |
|                  | 50%        | -                 | -   | 15  | 20  | 26  | 32  | 39  | 44  | 48  | 52  | 62  | 69  | 75  | 81  | 92  | 99  | 104 | 109 | 113 | 125 | 130 | 134 | 138 | 142 | 145 | 148 | 151 | 154 | 157 | 159 | 161 | 164 | -   | -   |     |     |
|                  | 40%        | -                 | -   | 20  | 27  | 35  | 42  | 48  | 52  | 65  | 73  | 80  | 93  | 101 | 107 | 113 | 125 | 131 | 136 | 141 | 145 | 149 | 153 | 156 | 159 | 162 | 165 | 167 | 184 | 191 | 197 | 202 | 207 | -   | -   |     |     |
|                  | 30%        | -                 | -   | 28  | 39  | 47  | 53  | 69  | 79  | 94  | 103 | 111 | 125 | 133 | 139 | 145 | 150 | 155 | 159 | 162 | 166 | 183 | 191 | 198 | 205 | 212 | 218 | 223 | 300 | 305 | 310 | 314 | 318 | -   | -   |     |     |
|                  | 20%        | -                 | -   | 46  | 60  | 76  | 95  | 108 | 125 | 136 | 144 | 152 | 158 | 163 | 180 | 192 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.



Table 47 16-bay, two-phase, no transformer unit Type F (&amp; UPS model number 9 = F)

| UPS Rating       | Load Level | # Battery Strings |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------|------------|-------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                  |            | 1                 | 2  | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23   | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  |     |
| 5kVA/<br>4.5kW   | 100%       | -                 | 5  | 16  | 26  | 39  | 48  | 62  | 76  | 93  | 104 | 120 | 130 | 138 | 145 | 152 | 157 | 162 | 166 | 185 | 195 | 204 | 212 | 219  | 226 | 304 | 309 | 314 | 319 | 324 | 328 | 332 | 335 | 339 | 342 | 345 |     |
|                  | 90%        | -                 | 6  | 18  | 28  | 43  | 52  | 71  | 83  | 102 | 113 | 130 | 139 | 147 | 154 | 159 | 164 | 181 | 193 | 203 | 211 | 219 | 227 | 305  | 311 | 317 | 322 | 327 | 331 | 335 | 339 | 342 | 345 | 420 | 423 | 426 |     |
|                  | 80%        | -                 | 7  | 20  | 35  | 48  | 65  | 80  | 100 | 113 | 131 | 141 | 149 | 156 | 162 | 167 | 190 | 202 | 212 | 221 | 301 | 308 | 314 | 320  | 325 | 330 | 335 | 339 | 343 | 346 | 422 | 425 | 428 | 431 | 433 | 436 |     |
|                  | 70%        | -                 | 9  | 25  | 41  | 52  | 76  | 98  | 112 | 132 | 143 | 152 | 159 | 165 | 188 | 201 | 212 | 222 | 303 | 311 | 318 | 324 | 330 | 335  | 340 | 344 | 420 | 424 | 427 | 430 | 433 | 436 | 438 | 441 | 443 | 445 |     |
|                  | 60%        | -                 | 11 | 28  | 47  | 69  | 94  | 111 | 133 | 145 | 155 | 163 | 183 | 199 | 212 | 224 | 306 | 314 | 322 | 329 | 335 | 340 | 345 | 421  | 426 | 429 | 433 | 436 | 439 | 442 | 444 | 447 | 449 | 451 | 453 | 455 |     |
|                  | 50%        | -                 | 14 | 37  | 53  | 83  | 110 | 134 | 148 | 159 | 167 | 196 | 212 | 226 | 309 | 318 | 327 | 334 | 340 | 346 | 423 | 428 | 432 | 436  | 439 | 443 | 445 | 448 | 451 | 453 | 455 | 457 | 459 | 461 | 462 | 464 |     |
|                  | 40%        | -                 | 19 | 46  | 76  | 108 | 136 | 152 | 163 | 192 | 212 | 300 | 313 | 324 | 333 | 341 | 420 | 426 | 431 | 436 | 440 | 444 | 447 | 450  | 453 | 456 | 458 | 460 | 462 | 464 | 466 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 30%        | -                 | 26 | 62  | 104 | 138 | 157 | 185 | 212 | 304 | 319 | 332 | 342 | 422 | 429 | 436 | 441 | 446 | 450 | 453 | 457 | 460 | 462 | 465  | 467 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |     |
|                  | 20%        | -                 | 42 | 99  | 144 | 166 | 214 | 312 | 331 | 345 | 428 | 437 | 444 | 450 | 455 | 459 | 463 | 466 | 480 | 480 | 480 | 480 | 480 | 480  | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
|                  | 10%        | -                 | 91 | 160 | 301 | 337 | 430 | 444 | 455 | 462 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480  | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| 10kVA/<br>9kW    | 100%       | -                 | -  | 5   | 10  | 16  | 21  | 26  | 32  | 39  | 44  | 48  | 52  | 63  | 70  | 76  | 81  | 93  | 99  | 105 | 109 | 120 | 125 | 130  | 135 | 139 | 142 | 146 | 149 | 152 | 155 | 157 | 160 | 162 | 164 | -   |     |
|                  | 90%        | -                 | -  | 6   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 103 | 109 | 120 | 126 | 131 | 136 | 140  | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 165 | 167 | 183 | 189 | -   |     |
|                  | 80%        | -                 | -  | 8   | 14  | 21  | 27  | 36  | 43  | 48  | 52  | 66  | 74  | 81  | 94  | 102 | 108 | 120 | 126 | 132 | 137 | 142 | 146 | 150  | 154 | 157 | 160 | 163 | 165 | 180 | 187 | 193 | 199 | 204 | 209 | -   |     |
|                  | 70%        | -                 | -  | 9   | 17  | 25  | 33  | 42  | 48  | 53  | 68  | 77  | 91  | 100 | 107 | 120 | 127 | 134 | 139 | 144 | 149 | 153 | 157 | 160  | 163 | 166 | 183 | 191 | 197 | 204 | 209 | 215 | 220 | 225 | 301 | -   |     |
|                  | 60%        | -                 | -  | 11  | 20  | 28  | 40  | 48  | 53  | 71  | 80  | 96  | 105 | 113 | 128 | 135 | 141 | 147 | 152 | 156 | 160 | 164 | 167 | 187  | 195 | 203 | 209 | 216 | 221 | 227 | 304 | 308 | 313 | 317 | 321 | -   |     |
|                  | 50%        | -                 | -  | 15  | 26  | 38  | 48  | 61  | 74  | 91  | 103 | 112 | 128 | 137 | 144 | 150 | 156 | 160 | 165 | 182 | 192 | 201 | 209 | 216  | 223 | 301 | 307 | 312 | 317 | 322 | 326 | 330 | 333 | 337 | 340 | -   |     |
|                  | 40%        | -                 | -  | 20  | 34  | 47  | 63  | 78  | 98  | 111 | 129 | 139 | 147 | 154 | 160 | 165 | 186 | 198 | 208 | 217 | 225 | 305 | 311 | 317  | 323 | 328 | 332 | 337 | 341 | 344 | 420 | 423 | 426 | 429 | 431 | -   |     |
|                  | 30%        | -                 | -  | 27  | 46  | 67  | 91  | 109 | 130 | 143 | 152 | 160 | 167 | 194 | 207 | 219 | 301 | 310 | 318 | 325 | 331 | 337 | 342 | 346  | 423 | 427 | 430 | 433 | 436 | 439 | 442 | 444 | 447 | 449 | 451 | -   |     |
|                  | 20%        | -                 | -  | 44  | 73  | 105 | 133 | 149 | 161 | 187 | 207 | 224 | 309 | 320 | 330 | 338 | 345 | 423 | 429 | 433 | 438 | 442 | 445 | 448  | 451 | 454 | 456 | 459 | 461 | 463 | 465 | 466 | 480 | 480 | 480 | -   |     |
|                  | 10%        | -                 | -  | 100 | 145 | 167 | 216 | 314 | 333 | 346 | 429 | 438 | 445 | 451 | 456 | 460 | 464 | 467 | 480 | 480 | 480 | 480 | 480 | 480  | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |
| 15kVA/<br>13.5kW | 100%       | -                 | -  | -   | 5   | 8   | 11  | 15  | 18  | 22  | 26  | 35  | 40  | 44  | 47  | 50  | 52  | 61  | 67  | 72  | 76  | 80  | 90  | 94   | 99  | 103 | 107 | 110 | 120 | 124 | 127 | 131 | 134 | 137 | 140 | -   |     |
|                  | 90%        | -                 | -  | -   | 6   | 10  | 14  | 18  | 22  | 26  | 30  | 35  | 40  | 44  | 47  | 50  | 52  | 61  | 67  | 72  | 76  | 80  | 90  | 94   | 99  | 103 | 107 | 110 | 120 | 124 | 127 | 131 | 134 | 137 | 140 | -   |     |
|                  | 80%        | -                 | -  | -   | 8   | 12  | 16  | 21  | 26  | 30  | 36  | 41  | 45  | 48  | 51  | 60  | 66  | 72  | 77  | 81  | 92  | 97  | 102 | 106  | 110 | 120 | 124 | 128 | 132 | 136 | 139 | 142 | 145 | 148 | 150 | -   |     |
|                  | 70%        | -                 | -  | -   | 9   | 14  | 19  | 25  | 30  | 37  | 42  | 46  | 50  | 53  | 65  | 72  | 77  | 82  | 94  | 100 | 105 | 110 | 120 | 125  | 130 | 134 | 138 | 141 | 145 | 148 | 151 | 153 | 156 | 158 | 161 | -   |     |
|                  | 60%        | -                 | -  | -   | 12  | 18  | 23  | 30  | 38  | 44  | 48  | 52  | 64  | 72  | 78  | 90  | 97  | 103 | 109 | 120 | 126 | 131 | 136 | 140  | 144 | 148 | 151 | 154 | 157 | 160 | 162 | 164 | 167 | 183 | 189 | -   |     |
|                  | 50%        | -                 | -  | -   | 15  | 22  | 28  | 39  | 45  | 50  | 62  | 71  | 79  | 92  | 100 | 107 | 113 | 126 | 132 | 138 | 143 | 147 | 151 | 155  | 158 | 161 | 164 | 167 | 184 | 191 | 197 | 203 | 208 | 213 | 218 | -   |     |
|                  | 40%        | -                 | -  | -   | 20  | 28  | 40  | 47  | 53  | 70  | 79  | 95  | 104 | 112 | 126 | 134 | 140 | 146 | 151 | 155 | 159 | 163 | 166 | 185  | 193 | 200 | 207 | 214 | 219 | 225 | 302 | 307 | 311 | 315 | 319 | -   |     |
|                  | 30%        | -                 | -  | -   | 28  | 42  | 50  | 68  | 80  | 99  | 110 | 126 | 136 | 144 | 151 | 156 | 161 | 166 | 186 | 196 | 205 | 214 | 221 | 300  | 306 | 312 | 317 | 322 | 327 | 331 | 335 | 338 | 342 | 345 | 420 | -   |     |
|                  | 20%        | -                 | -  | -   | 45  | 65  | 83  | 107 | 128 | 141 | 151 | 159 | 165 | 190 | 204 | 216 | 226 | 307 | 315 | 322 | 329 | 334 | 340 | 344  | 421 | 425 | 428 | 432 | 435 | 438 | 440 | 443 | 445 | 447 | 449 | -   |     |
|                  | 10%        | -                 | -  | -   | 102 | 136 | 155 | 180 | 207 | 300 | 316 | 329 | 339 | 420 | 427 | 433 | 439 | 444 | 448 | 452 | 455 | 458 | 461 | 463  | 466 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | 480 | -   |     |
| 20kVA/<br>18kW   | 100%       | -                 | -  | -   | -   | 5   | 7   | 10  | 12  | 15  | 18  | 20  | 23  | 26  | 28  | 32  | 35  | 38  | 41  | 44  | 46  | 48  | 50  | 52   | 53  | 61  | 65  | 69  | 72  | 75  | 78  | 80  | 83  | 92  | -   | -   |     |
|                  | 90%        | -                 | -  | -   | -   | 6   | 9   | 11  | 14  | 18  | 20  | 23  | 26  | 28  | 33  | 37  | 40  | 43  | 45  | 48  | 50  | 51  | 53  | 63   | 67  | 70  | 74  | 77  | 80  | 83  | 92  | 95  | 99  | 102 | -   | -   |     |
|                  | 80%        | -                 | -  | -   | -   | 7   | 10  | 14  | 17  | 20  | 23  | 27  | 31  | 35  | 39  | 42  | 45  | 48  | 50  | 52  | 60  | 65  | 69  | 73   | 77  | 80  | 83  | 93  | 97  | 100 | 104 | 107 | 110 | 113 | -   | -   |     |
|                  | 70%        | -                 | -  | -   | -   | 9   | 13  | 17  | 20  | 25  | 28  | 33  | 38  | 42  | 45  | 48  | 50  | 53  | 63  | 68  | 73  | 77  | 80  | 90   | 95  | 99  | 103 | 107 | 110 | 113 | 123 | 126 | 130 | 133 | -   | -   |     |
|                  | 60%        | -                 | -  | -   | -   | 11  | 16  | 20  | 25  | 28  | 36  | 41  | 45  | 48  | 51  | 53  | 66  | 71  | 76  | 81  | 91  | 97  | 101 | 106  | 110 | 113 | 124 | 128 | 132 | 135 | 139 | 142 | 145 | 147 | -   | -   |     |
|                  | 50%        | -                 | -  | -   | -   | 15  | 20  | 26  | 32  | 39  | 44  | 48  | 52  | 62  | 69  | 75  | 81  | 92  | 99  | 104 | 109 | 113 | 125 | 130  | 134 | 138 | 142 | 145 | 148 | 151 | 154 | 157 | 159 | 161 | -   | -   |     |
|                  | 40%        | -                 | -  | -   | -   | 20  | 27  | 35  | 42  | 48  | 52  | 65  | 73  | 80  | 93  | 101 | 107 | 113 | 125 | 131 | 136 | 141 | 145 | 149  | 153 | 156 | 159 | 162 | 165 | 167 | 184 | 191 | 197 | 202 | -   | -   |     |
|                  | 30%        | -                 | -  | -   | -   | 28  | 39  | 47  | 53  | 69  | 79  | 94  | 103 | 111 | 125 | 133 | 139 | 145 | 150 | 155 | 159 | 162 | 166 | 183  | 191 | 198 | 205 | 212 | 218 | 223 | 300 | 305 | 310 | 314 | -   | -   |     |
|                  | 20%        | -                 | -  | -   | -   | 46  | 60  | 76  | 95  | 108 | 125 | 136 | 144 | 152 | 158 | 163 | 180 | 192 | 202 | 212 | 220 | 300 | 306 | 313  | 318 | 324 | 328 | 333 | 337 | 341 | 344 | 420 | 423 | 426 | -   | -   |     |
|                  | 10%        | -                 | -  | -   | -   | 102 | 129 | 146 | 159 | 180 | 201 | 218 | 304 | 316 | 326 | 334 | 341 | 420 | 425 | 430 | 435 | 439 | 443 | 4464 |     |     |     |     |     |     |     |     |     |     |     |     |     |

Run times in this table are approximate. They are based on new, fully charged standard battery modules at a temperature of 25°C (77°F) with 100% resistive UPS loading.











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